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JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

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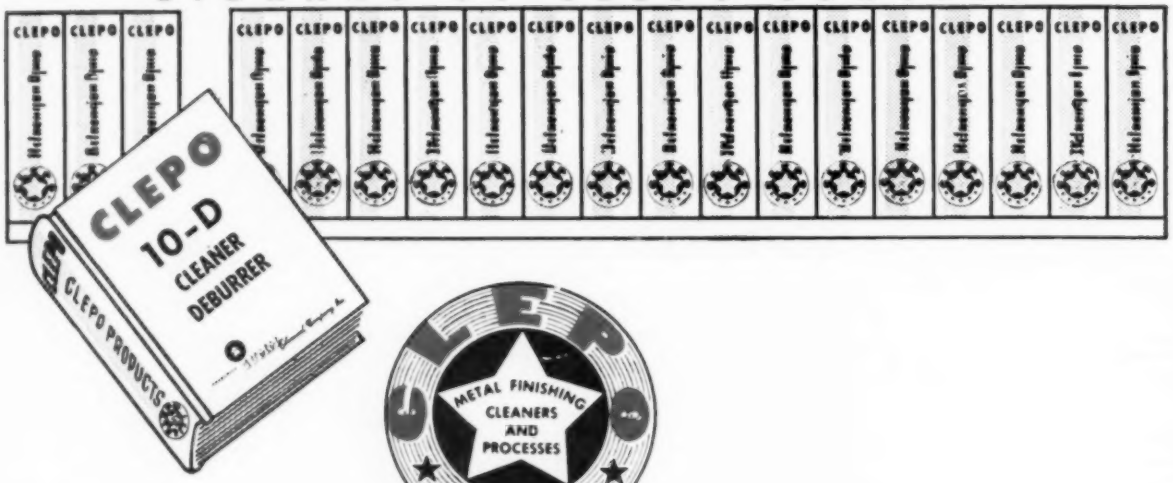
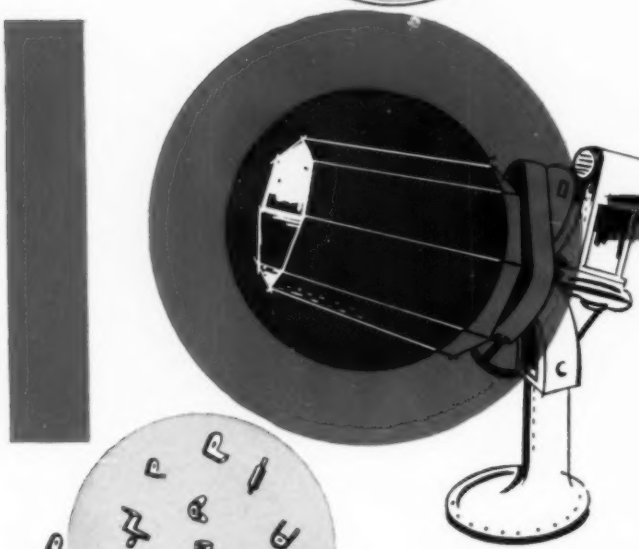


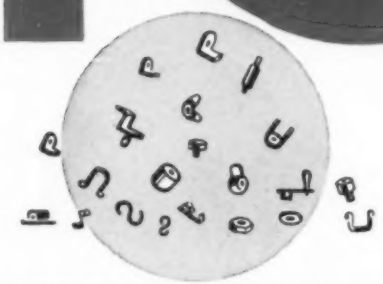
CLEPO
METAL FINISHING
CLEANERS
AND
PROCESSES

10-D



IN AN
OBLIQUE
BARREL

The ideal combination for cleaning small self-rolling parts of dirt, oil, and removing light burrs... economically. In conjunction with CLEPO 191-D, it removes rust and scale.



CLEPO 10-D functions in two ways, simultaneously. It cleans small parts such as stamping or machine screw parts. And it deburrs and burnishes at the same time, producing a good lustre on the work. Operators can handle the parts for painting, plating or assembling without danger of cutting their fingers.

CLEPO 10-D is formulated especially for small self-rolling pieces. If your work is in this class, place a trial order for this excellent cleaner-deburrer. If your work is not in this class, tell the CLEPO Field Service Man about your cleaning and deburring problems. He has many formulations from which to select.

FREDERICK
B-FG2

GUMM *Chemical Company Inc.*
538 FOREST STREET, KEARNY, N. J.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 800.

INDICATE A 801.

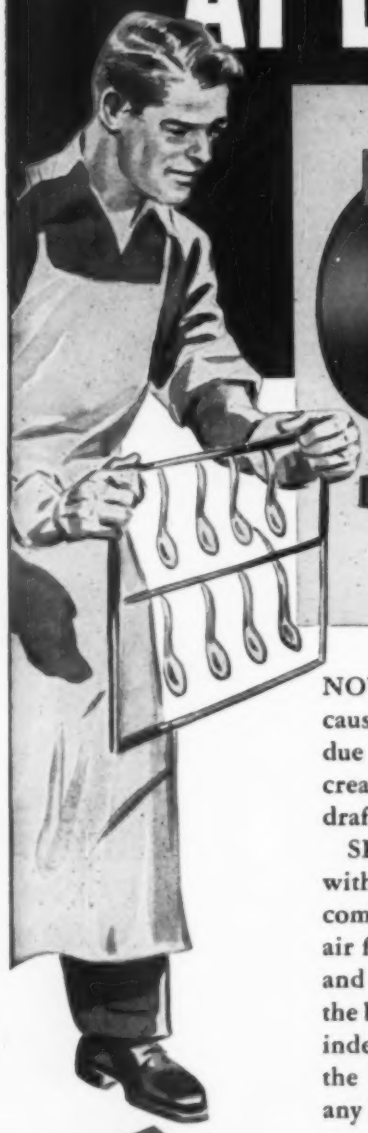
How to make metal stripping an exact science: What metal do you want to strip? There are eight metal strippers in the Enthone "ENSTRIP" series, which, in most cases, will do the specialized job thoroughly, quickly, economically. If one of these standard strippers won't precisely cover your requirements, there are special Enthone research developments available. Write us about your particular needs or problems. Include a sample of your product if possible. We'll be glad to recommend the best methods to follow. Enthone, Inc., 442 Elm Street, New Haven 11, Conn.

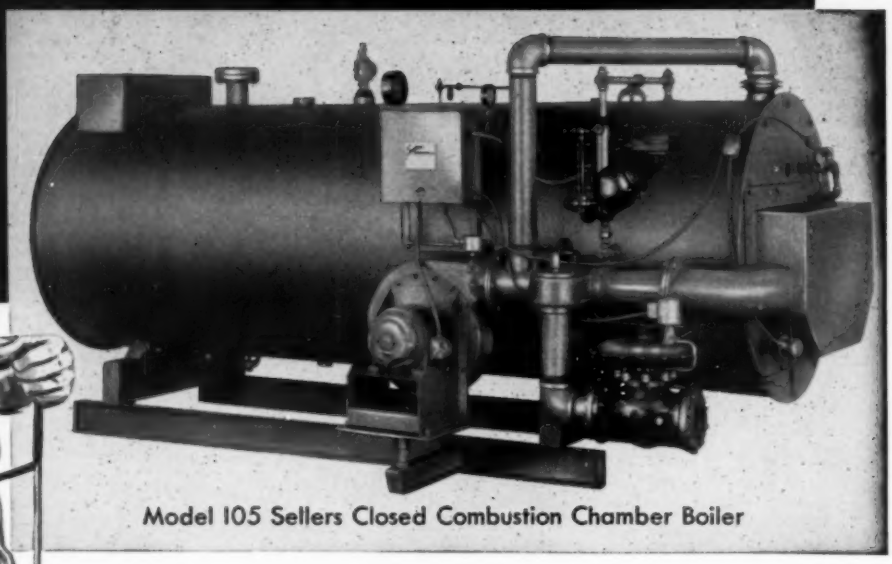
ENTHONE

ENTHONE, INC. IS A SUBSIDIARY OF AMERICAN SMELTING AND REFINING COMPANY

58-1

AT LAST A BOILER DESIGNED FOR THE PLATER!





Model 105 Sellers Closed Combustion Chamber Boiler

NOW—No more foul fumes because of incomplete combustion due to back draft through boiler created by exhaust fans or poor draft conditions.

SELLERS solves this problem with the improved design, closed combustion chamber boiler. All air for combustion, both primary and secondary, is pushed through the boiler under positive pressure, independent of partial vacuum in the building and independent of any back draft on the chimney (of course, products of combustion must be removed from building).

A positive pressure blower supplies air under pressure which is mixed with the gas and passed to burners in the completely closed combustion chamber; to complete combustion, secondary air is fed into the closed chamber under positive pressure (many times greater than the vacuum in the building). By this method of securing positive complete combustion, burned gases are pushed through the boiler and FOUL FUMES ARE ELIMINATED.

Read about these Extra Features in Catalog 5206

1. NOW—SCHOOL ROOM QUIET
2. ALL-ON, ALL-OFF RUNNER PILOTS
3. NO OPEN FLAME
4. WORKS ON LOW GAS PRESSURE
5. POSITIVE PRESSURE BLOWER OVERCOMES BUILDING VACUUM AND CHIMNEY BACK DRAFT
6. SIZES FROM 15 HP TO 200 HP

Sellers ENGINEERING CO.

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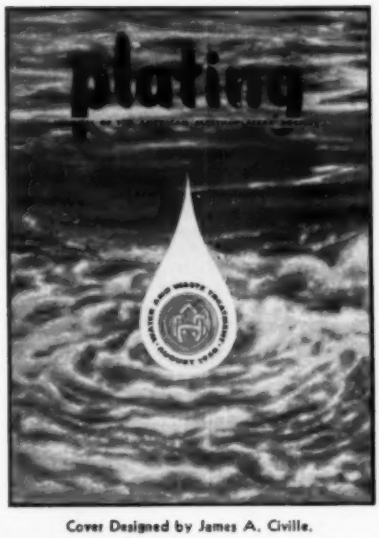

Cover Designed by James A. Civille.

plating

Journal of the American Electroplaters' Society

August 1958 — **Vol. 45, No. 8**

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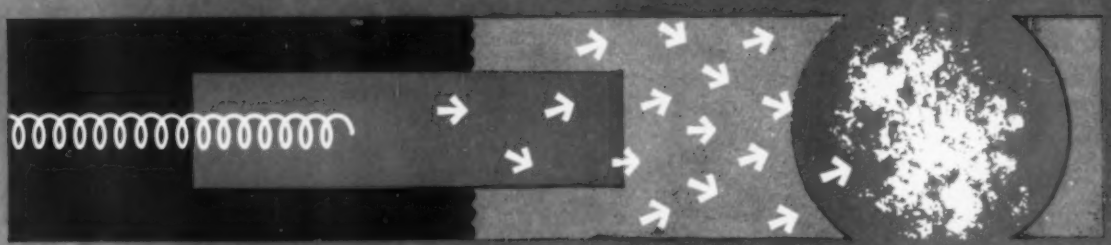
HARSHAW PRESENTS **2** *new, outstanding* BRIGHT COPPER PLATING PROCESSES

HARSHAW CYNOREX Copper Plating Process

(High Speed Copper Cyanide)

The Harshaw CYNOREX copper process is a new high speed copper cyanide bath which produces a bright and ductile copper by the use of a single addition agent designated as CYNOREX No. 1. It has many advantages including unusual brightness; a smooth fine grain and ductile deposit; stability; high efficiency; economical operation; and high tolerance to metallic impurities. The process can also be operated with air agitation.

The CYNOREX process is easy to maintain and operate because it has only one brightening addition agent. It is a non-metallic addition agent which is very stable and is not removed by carbon circulation. Since the brightener is not removed by carbon and the cathode and anode current efficiencies of the bath are 100%, operational costs are kept to a minimum. Because of the stability of the single brightening addition agent, the CYNOREX bath will produce satisfactory bright deposits even after extremely long periods of shutdown. A compatible wetting agent is available where operating conditions dictate its use.



HARSHAW CUPREX Copper Plating Process

(Acid Copper)

Among the advantages of the new CUPREX acid copper process are its superior brightness, excellent leveling, ductility, and stability. Also, the bath can be operated not only as a still or cathode rod agitated solution but also with air agitation. Another distinctive advantage of this process when operated still or with cathode rod agitation is that a cyanide copper strike is not required for adhesion of the copper to the base metal. As an air agitated solution the normal copper or nickel strike is required. The bath has indefinite operational life and therefore, the problem of treatment cleanups is at a minimum. In this respect CUPREX is superior to other bright acid copper plating processes.

The bright throwing power of the CUPREX copper bath is superior to any competitive acid copper plating solution. The deposit is the most easy to buff of any acid copper plate because of its great leveling and hiding power. Nodular build up in all instances is characteristically at a minimum.

The CUPREX process yields a deposit having a high ductility thru the entire range of conditions and compositions used to vary the deposit from an excellent semi-bright to the fully bright appearance so easily obtained.

Each of these new outstanding Harshaw Bright Copper Plating Processes has certain unusual characteristics which fit into the product finishing requirements in your plant.

Contact the Harshaw Branch nearest you. Harshaw representatives will be happy to discuss with you the application of these processes in your plant.

The Harshaw Chemical Co.

1945 East 97th Street • Cleveland 6, Ohio

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EDITORIAL

THE MUSTARD SEED

GREAT IMPROVEMENTS OFTEN ORIGINATE in a small way. This is true of political parties, of social reforms, even of national governments. Historians like to trace the origin of this country as a separate nation to a certain tea party held in Boston in 1773. This was really the beginning of the Revolutionary War.

Consider, if you will, the American Electroplaters' Society. It is now world-wide. Its influence is recognized. It has many members. Among its membership can be found plant owners, plant managers, engineers, designers, scientists, technicians and practical electroplaters, all dedicated to the dissemination of knowledge of the science of electroplating, metal finishing and allied arts.

This Society originated in the vision of one Charlie Proctor who recognized the value of an organization where men could join together to share the knowledge being gained daily in the field of electroplating.

How did it begin? As a world-wide organization? No—as a small seed planted in the ground that gradually grew into a great tree. Charlie Proctor gathered together a few of his friends and asked them to join him in forming a Society to help one another in their chosen field of endeavor. From these humble beginnings has grown the great tree of our Society whose branches now encompass the world.

Let us apply this historical fact to our own lives. We often grow discouraged at the magnitude of a work before us. A child beginning school and looking forward to the work that is to be done, sees it in its vastness and rightly becomes discouraged. The same is true with men entering business or professional life or undertaking some new field of work or activity. Viewed as a whole, the work seems very large and very great.

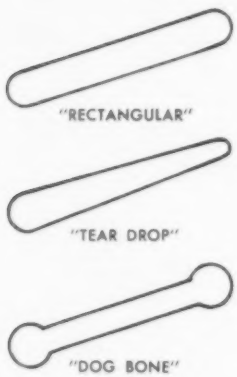
It is when we are faced with problems like these that we must remember the lesson of the mustard seed. Do not look at the vastness of the work to be done. Begin instead in a small way and do that thoroughly and well. It may seem a small thing but it is by an accumulation of these small accomplishments that the greater task will be achieved.

Let us begin now to do our part toward the achievement of an even bigger and better American Electroplaters' Society.

Herberth E. Head

President

Controlled Grain Size with American Extruded Silver Anodes



These scientifically shaped anodes retain 80% of original active surface area after 85% by weight has been plated off!

Costs are lowered by prolonged anode life, minimized polarization and less silver scrap to be refined. In addition, the APW Extrusion Process controls grain size within definite ideal limits so that corrosion is smooth and uniform. Electro-deposits are consistently smooth. Shedding is virtually eliminated. Rejects are a comparative rarity!

We are anxious that the silver you buy in anodes is used most efficiently and economically. Special anode shapes will be engineered to meet your particular plating bath conditions. Call or write for a representative. We'll be glad to assist with your plating problems.

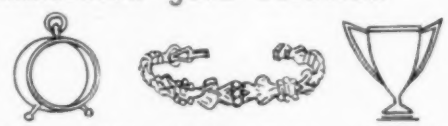
AMERICAN PLATINUM
& SILVER DIVISION
231 New Jersey Railroad Ave.
Newark, New Jersey

RHODIUM PLATING for greater protection . . . greater wear

RING SHANKS SETTINGS | PRINTED CIRCUITS | RELAYS

Rhodium is one of the group of platinum metals. It has a hard, brilliant white, non-tarnishable, highly reflective surface. It is extremely resistant to corrosive conditions. These properties make rhodium particularly valuable in many decorative, industrial, electrical and electronic applications. In general rhodium adds lustre to jewelry and other decorative objects. It protects electrical contacts and shows negligible wear when subjected to constant abrasion of moving parts. If you have a particular plating problem where utmost protection is needed, investigate rhodium.

ATOMEX immersion gold solution



CLOCK ASSEMBLIES | COSTUME JEWELRY | TROPHIES

A fast, economical plating process for depositing a thin layer of 24 Karat Gold on a wide variety of industrial items. By means of a simple bath a dense coating can be achieved with 30 per cent less gold. All parts of the object receive a uniform deposit. All the gold in the bath is used and the spent solution is discarded. Analytical Control is not necessary. Atomex is a useful addition to any plating shop.

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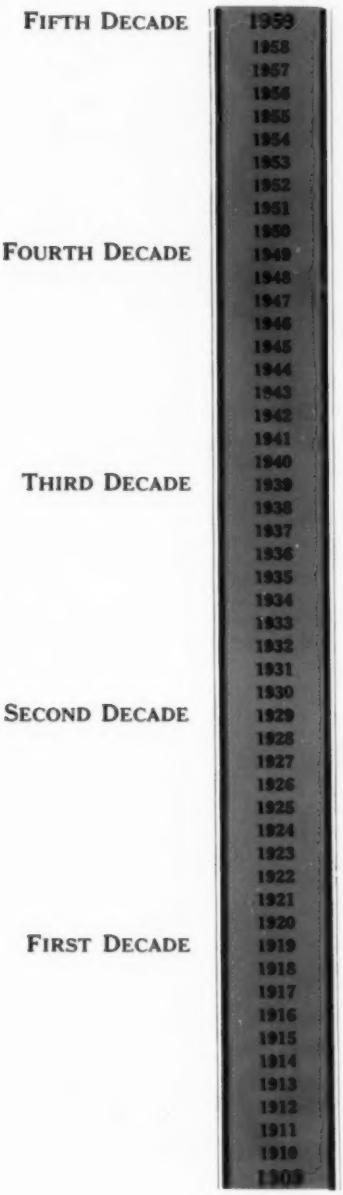
PLATING MAGAZINE HAPPILY ANNOUNCES . . .



THE American Electroplaters' Society (AES) observes its Fiftieth Anniversary from July 1, 1958 through June 30, 1959.

NOT only will that observance be climaxed by the Golden Jubilee Convention and Industrial Finishing Exposition, including the Fifth International Conference on Electrodeposition and Metal Finishing, to be held in Detroit, June 14-19, 1959 with the AES's Detroit Branch as host BUT ALSO by PLATING MAGAZINE'S Golden Jubilee Issue to appear in June 1959.

A LARGE feature issue beamed both for immediate interest to PLATING'S global circulation and for long retainment as an AES reference source and as a memento of this once-in-a-lifetime, year-long observance, this issue will provide advertisers with a unique opportunity to reach the vast purchasing power in this field served by PLATING MAGAZINE, AES's official journal.

DEMAND for advertising space looms large, both for institutional and product advertising. Assure yourself of accommodation by placing your insertion order NOW, particularly for special, preferred or premium positions.

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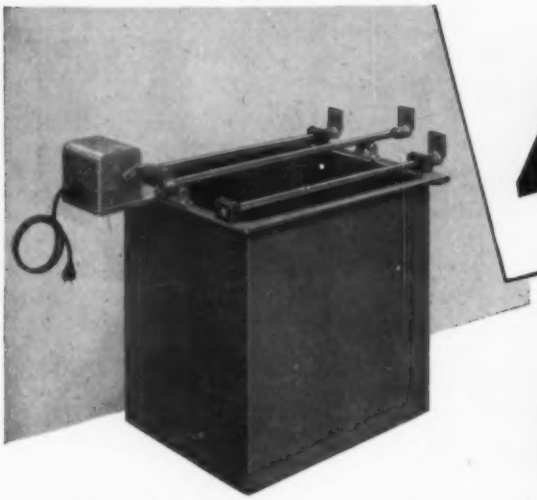


BELKE Rod Agitator for Small Tanks

Variable speed—for rods to ¾" diameter

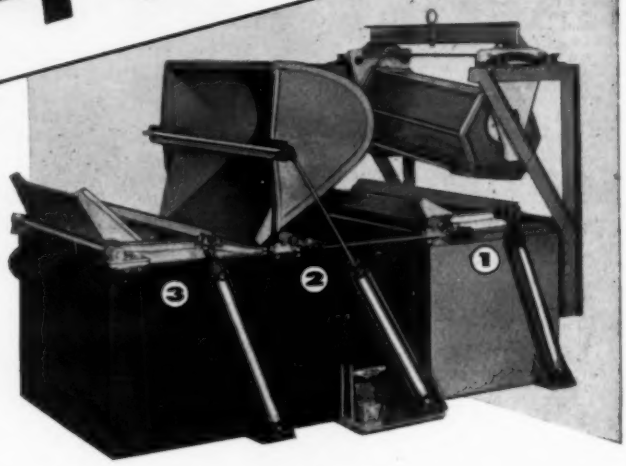
The perfect answer to improved plating of printed circuits, precious metals, costume jewelry, and small lot work of all kinds.

Easily installed—Bolts to tank flange.

Speeds—12 to 29, 3" strokes per minute.

Furnished with tank or for tank you have.

BELKE Rod Agitators are available for tanks of all sizes. Send for literature.



New BELKE Air Operated Rinse Hoppers

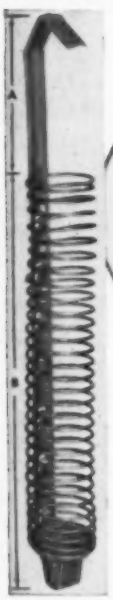
For low cost, accurately timed rinsing, chromating and bright dip finishing.

Unit illustrated has three perforated hoppers each independently operated by air cylinders on both sides of the tank.

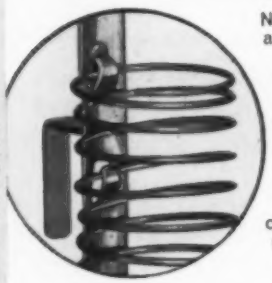
Hopper No. 2 has automatic timing control for accurate emersion time. Compartment No. 1 and hopper are plain steel. The other compartments are Tygon Lined and Tygon coated; the other hoppers are 3/16" stainless steel.

Available with required number of hoppers, of specified materials, with manual, partial automatic or full automatic operation. See your BELKE Service Engineer or write.

BELKE Weldless Anode Baskets



Withstand the many new solutions that eat up welds.



Note weldless attachment of basket to spine—also extra hook (furnished when specified) used to hold basket high so operator can see when more anodes are needed.

No welds to come open

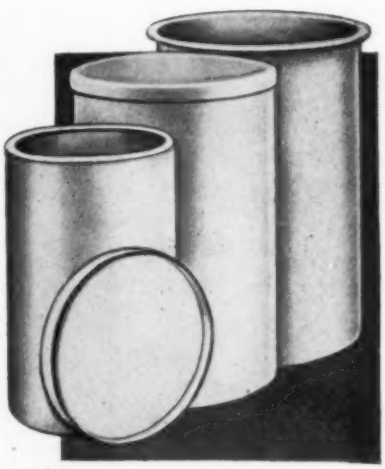
The 3/32" x 1" cold rolled spine is formed at the bottom to hold the basket without welding. Die-formed tongues on the spine hold coils of the .156" Premier Spring Steel Basket.

Available as illustrated or with the extra hook shown in the inset; also curved to specifications. Standard lengths: Dim. A, 6"; Dim. B, 18, 21, 24, 27, and 33 inches.

Polyethylene Tanks and Pails

Corrosion resistant, tough, easy to move. One-piece molded of virgin polyethylene.

	30 gal.	55 gal.
Height	27"	32½"
O.D.	18"	22¼"
Walls	3/32"	1/8"
Each	21.75	24.00
with OUTSIDE FLANGE		
No.	30-OF	55-OF
with INSIDE FLANGE		
No.	30-IF	55-IF
Covers		
Each	4.50	6.00
No.	30-IFC	55-IFC

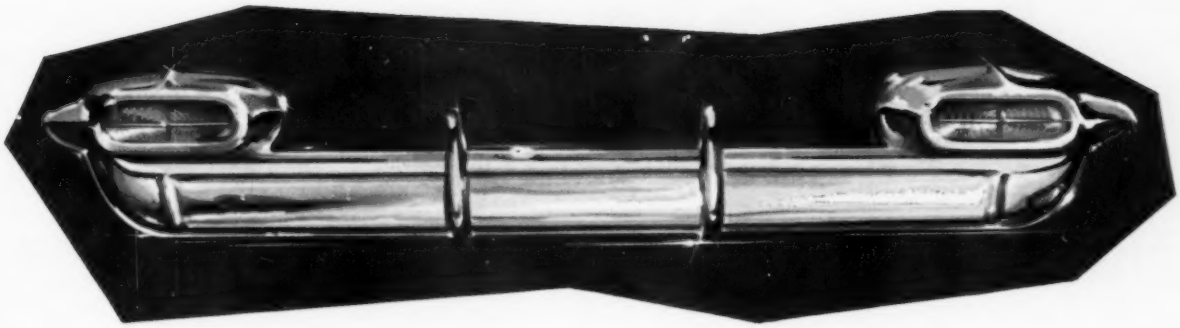


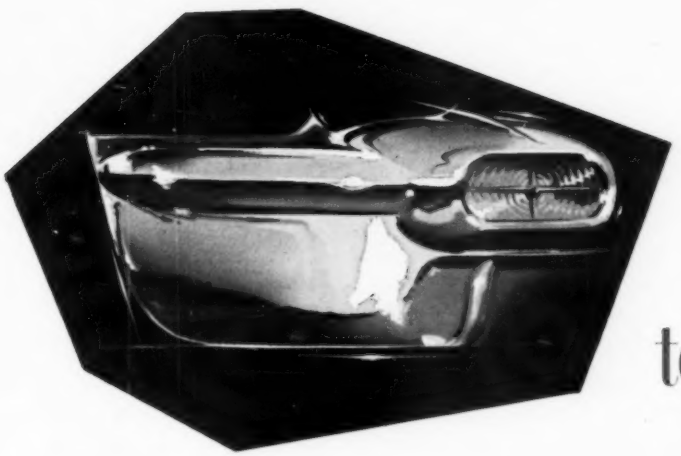
Polyethylene Pails

Have steel bails covered with Tygon Tubing

Qts.	Cat. No.	Price Each
11	11QP	$3.00
14	14QP	3.50
17	17QP	4.00

Belke MANUFACTURING COMPANY
947 N. Cicero, Chicago 51
EVERYTHING FOR PLATING PLANTS





Acme designs custom setups to volume-finish difficult shapes

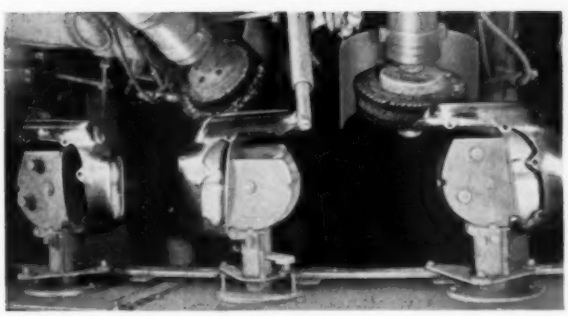


Photo shows three of twenty-one operations on Acme machine for finishing all contours of auto bumper part. At each station, part is automatically positioned and buffed by 20-hp floating-head lathe.

Polishing or buffing difficult contours on a volume basis can only be a successful and economical operation when the equipment is designed for the job—by experts. That's why, for nearly fifty years, manufacturers have turned to Acme-designed equipment.

Skilled Acme engineers receive the problem-product and, with *standard* units and a wide variety of accessories, design a *custom* machine to do the complete job. Each model change brings new challenges, yet much of the Acme equipment can be used year after year.

Next time finishing problems come up, give them to an Acme engineer. He's used to them.

LET ACME *Polish Off*

YOUR FINISHING PROBLEMS

ACME MANUFACTURING COMPANY

1400 E. 9 MILE ROAD, DETROIT 20, MICHIGAN

LEADING PRODUCERS OF AUTOMATIC POLISHING AND BUFFING EQUIPMENT SINCE 1910

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 806.

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Wyandotte for lower metal-finishing costs, complete service

Wyandotte offers you the complete line of cost-cutting industrial chemical products to improve the quality of your metal-finishing operations.

In addition, Wyandotte provides prompt, accurate, and thorough technical service through trained representatives. This service, together with warehouse stocks, is available from coast to coast.

We can accurately **survey** and **analyze** all your specialized chemical-finishing operations. Let us help you — no obligation. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

Wyandotte CHEMICALS

J. B. FORD DIVISION

Wyandotte's complete line of products for metal finishing:

★ **Buffing Compound Removers.** MERSOCLEAN-540 process for all metals.

★ **Electrocleaners.** Anodic and Cathodic—for steel, copper, brass, zinc die castings, nickel, and other metals: F.S.,* B.N., C.S.R.,* LECTRITE-NF.

★ **Soak Cleaners.** Complete line for the electroplating, vitreous enameling, and painting industries: W.L.G.,* ALTREX,* NO. 11 CLEANER, RUVAT.

★ **Barrel-Finishing Compounds.** De-burring and burnishing types for steel, stainless steel, brass, zinc die castings, aluminum, and copper.

★ **Washing-Machine Cleaners.** Alkaline and emulsion types, for spray and rotary machines: EXPRAY-AP, INDUSTRIAL 38, NORDALL,* EMLON.*

★ **Paint Removers.** Alkaline and solvent types, for all finishes on all metals.

★ **Paint-Preparation Products.** Cleaning and phosphating processes: PRE-FOS,* PHOS-IT.*

★ **Paint-Department Maintenance.** Water-wash compounds, dry-wall compounds, booth-cleanout compounds.

★ **Rust and Scale Removers.**

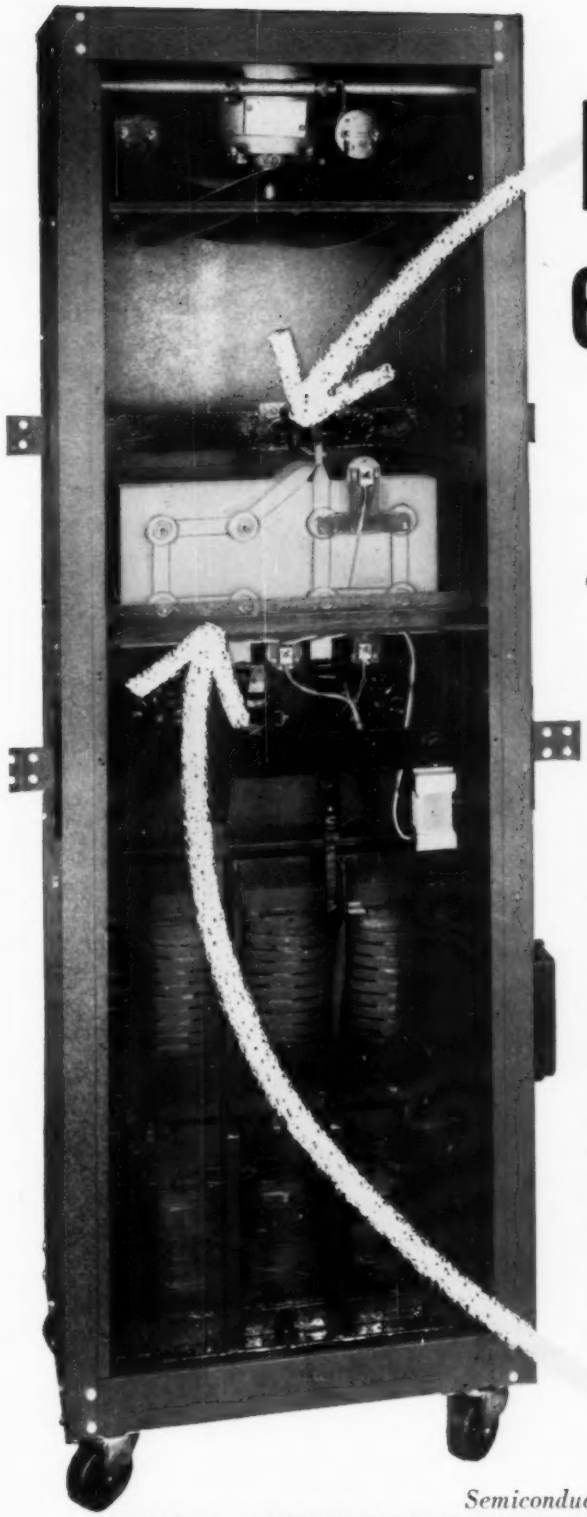
★ **Aluminum-Specialty Products.** Etchants, de-smutting compounds, preparation for spot welding, brighteners.

★ **Rust Preventatives.** R-2, NORDALL.*

★ **Neutralizers.** For pickling and vitreous-enameling lines.

*Reg. U.S. Pat. Off.

"The Best in Chemical Products for Metal Finishing"



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at the heart of your plating equipment

talk to your rectifier supplier about...

Radio Receptor hcd* petti-sel
Selenium Rectifiers *high current density

Buy rectifier *performance* for ideally functioning plating equipment – not just a lot of space-consuming square inches. Petti-Sel high current density rectifiers are now revolutionizing the manufacture of power supplies for plating in this country as they've been doing in European applications for a long time. Once installed you can forget them because they're trouble free.

A development of the famous Siemens of Germany, Radio Receptor produces them exclusively in the U. S. Their outstanding characteristics are not even approached by any standard rectifiers available today. When you need new plating equipment, make sure it's *really* modern. See that the power supply contains HCD Petti-Sel Rectifiers! Literature upon request.

Semiconductor Division
RADIO RECEPTOR COMPANY, INC.
Subsidiary of General Instrument Corporation
240 Wythe Avenue, Brooklyn 11, N. Y., EVergreen 8-6000

GENERAL INSTRUMENT CORPORATION ALSO INCLUDES
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General Instrument Semiconductors

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 808.

...If we had it all to do over again...

we would still put prime emphasis on research and service . . . research into newer and better products giving superior metal finishing economically . . . research into advanced techniques and new concepts making the job easier, faster and more effective . . . research into all facets of metal surface preparation.

. . . and service you can count on from men with "know-how" . . . "shirt-sleeve" service that works with you on all finishing problems . . . fast service when and where you need it.

On this our 35th Anniversary, we continue to put unrelenting emphasis on research and service . . . and if you check with us after 100 years, you would still find our company progressing on this same firm basis.

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NEW... FROM ROHCO® RESEARCH

RO-BRIGHT

Full-Bright • High-Speed

CYANIDE COPPER PLATING PROCESS

✓ BRIGHTNESS . . . Extremely wide and usable production bright plating range through current densities up to 80 amps. per square foot. Good results obtainable with either direct, interrupted, or periodic reverse current.

✓ HIGH SPEED . . . Outstanding uniformity between high and low current density areas permits shorter plating time and eliminates excessive build-up on high current density areas to achieve minimum thickness of deposit in recesses, thus saving time and metal.

✓ FLEXIBILITY . . . May be used with potassium, sodium, or mixed formulation to produce semi-bright or full-bright copper as desired. May be used *with or without* Rochelle Salts with equal effectiveness.

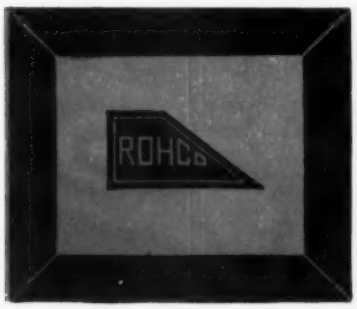
✓ EASE OF CONTROL . . . Addition agents easily controlled by Hull Cell Test.

✓ ECONOMY . . . Low operating cost through reasonably and identically priced addition agents. Quantity discounts apply to total gallons ordered in any combination. Three liquid products cover all applications for semi- to full-bright deposition, namely:

RO-BRIGHT 1100 — WETTING AGENT

RO-BRIGHT 1250 — PRIMARY BRIGHTENER

RO-BRIGHT 1400 — SECONDARY BRIGHTENER



Ask your ROHCO Representative—or write for details. Send sample of your bath for conversion recommendations!

---------- Nationwide Stockpoints ----------

R. O. HULL & COMPANY, INC.

1302 Parsons Court • Rocky River 16, Ohio

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 810.

New additive improves all cyanide copper and bronze baths...

NEOCHEL*

M&T NEOCHEL, a compatible liquid formulation, can be used in place of Rochelle salt and proprietary additives to the great advantage of the user.

Improved cathode efficiency . . . Baths containing Neochel plate faster than those containing other available additives.

Higher anode efficiency . . . even at current densities where other additives lose effect rapidly.

Minimizes effect of contaminants. With reducing and chelating action, NEOCHEL cuts effect of chromium contamination, promotes satisfactory deposits.

Cuts cyanide consumption. Higher anode efficiency slows cyanide decomposition and consumption, thereby cutting a major bath upkeep cost.

Retards carbonate build-up. Less cyanide decomposition at anodes means less oxidation and consequently less carbonate.

Smoother deposits . . . because anode corrosion is better; and troublesome hard water precipitates are reduced.

NEOCHEL outperforms anything that's been available to now to improve bath operation. It means more efficient cyanide copper and bronze plating, contributes to better results, helps curb operating problems. Cuts costs, too. It will pay you to get all the facts . . . direct from an M&T plating engineer. Or from our Bulletin No. 158. Send for your copy today.

**Pat. applied for.*

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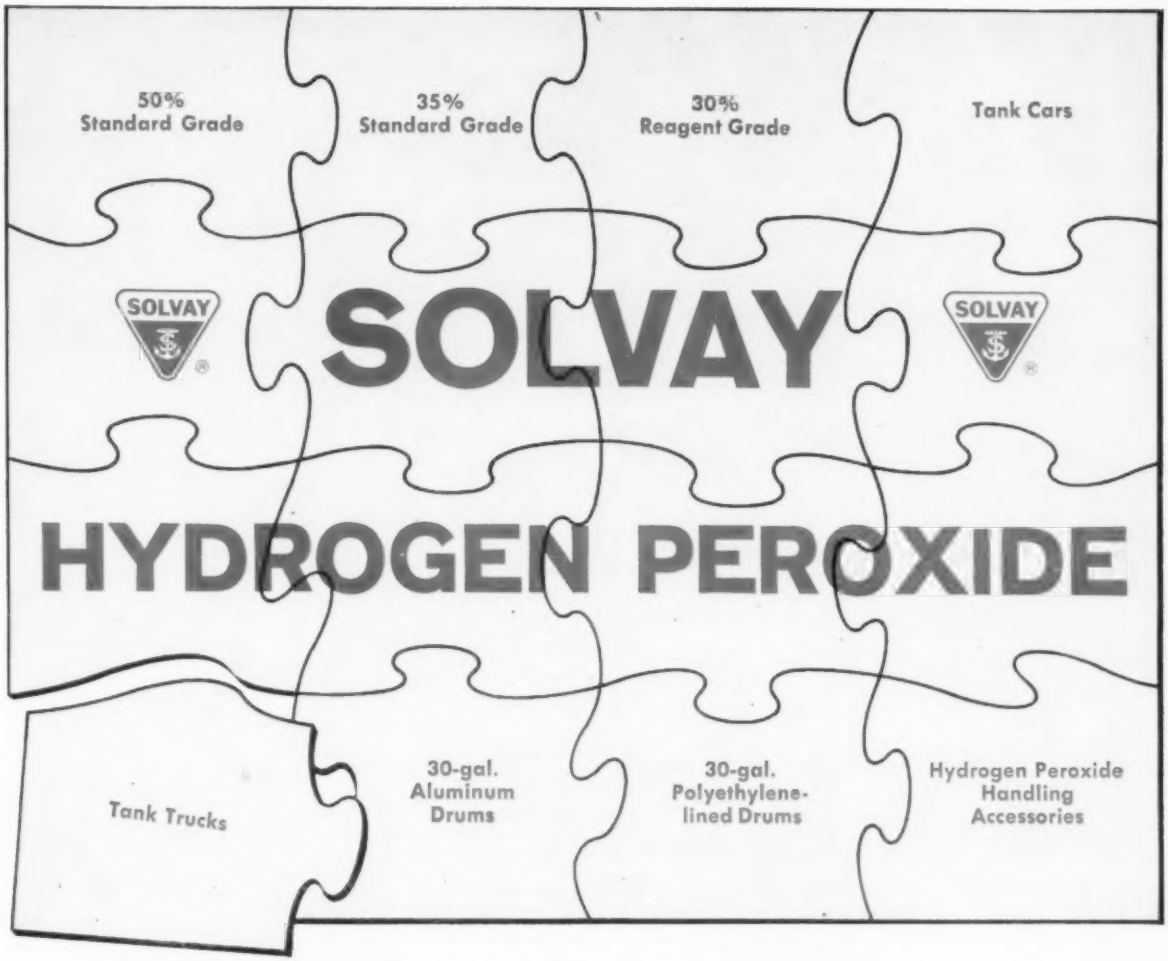

. . . well-fitted to meet your needs

SOLVAY is prepared to supply you with hydrogen peroxide in either standard or reagent grades. The standard grades—both 35% and 50% strengths—are packed in 30-gal. aluminum drums, tank trucks and tank cars. The 30% reagent grade is packed in 30-gal. polyethylene-lined drums. SOLVAY is also prepared to supply special Hydrogen Peroxide Technical Service to help you in handling, storage or process applications.

Sodium Nitrite • Potassium Carbonate • Caustic Soda • Chlorine
Calcium Chloride • Sodium Bicarbonate • Ammonium Chloride
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Para-dichlorobenzene • Methyl Chloride • Cleaning Compounds
Hydrogen Peroxide • Aluminum Chloride • Ammonium Bicarbonate
Soda Ash • Carbon Tetrachloride • Mutual Chromium Chemicals
Monochlorobenzene • Ortho-dichlorobenzene • Snowflake® Crystals

SOLVAY branch offices and dealers are located in major centers from coast to coast.

Allied Chemical

SOLVAY PROCESS DIVISION
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Hydrogen Peroxide Dilution Data Book

Gives complete information on diluting SOLVAY Hydrogen Peroxide to the concentrations you need—plus important facts on handling, stabilizing, storing and analyzing dilute solutions. Mail coupon now for your copy!

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Please send without cost your book, "Dilution of Hydrogen Peroxide."

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NEW from UDYLITE...

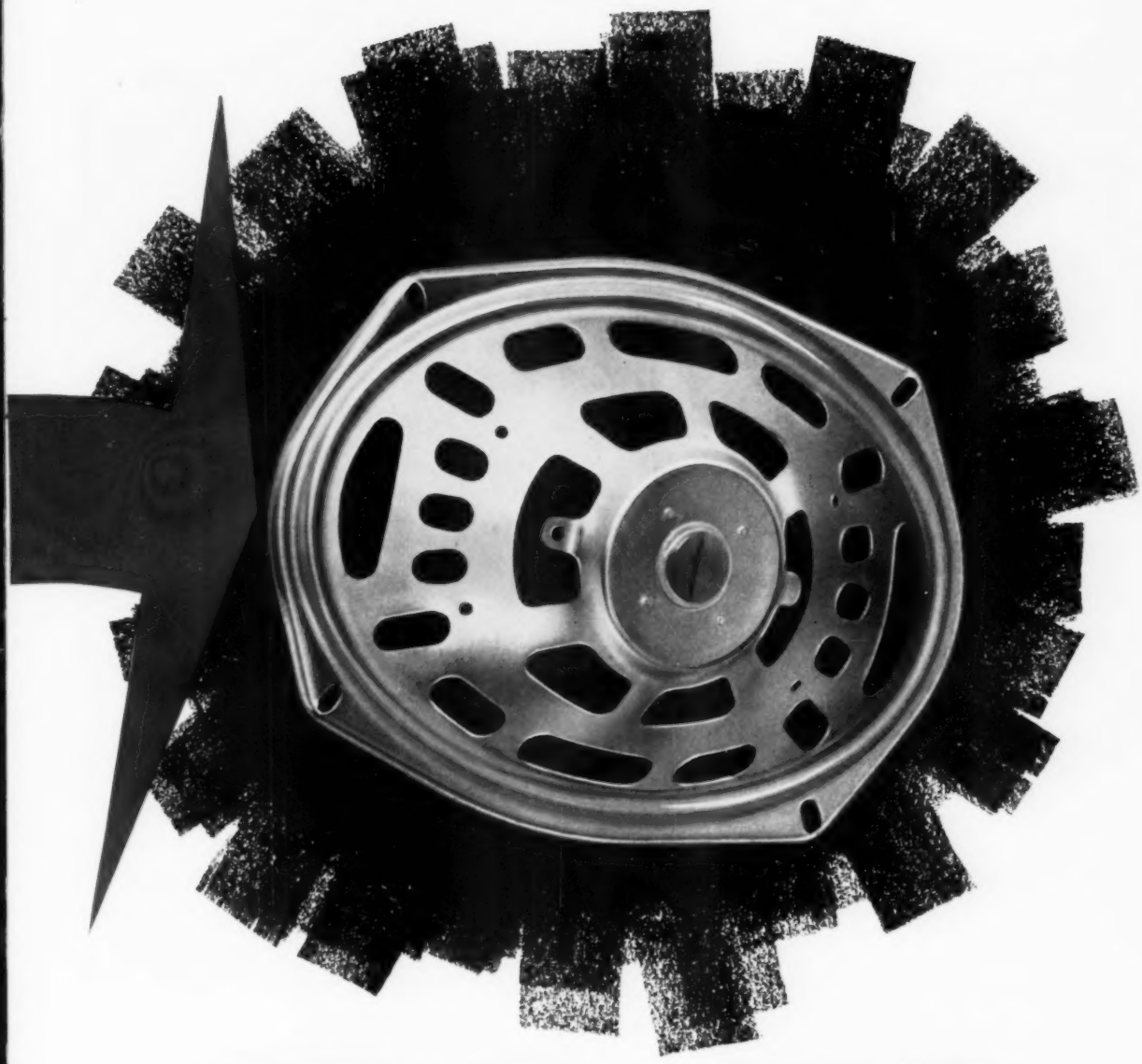
THE FASTEST BRIGHT ZINC EVER!

AN ENTIRELY NEW PROCESS FOR BRIGHT ZINC RACK PLATING

Now, Udylite announces, ZS-58, the fastest bright zinc process ever developed for rack plating. Over 4,000 hours of research—4,000 hours of probing, testing and analyzing have gone into the perfection of ZS-58. The results of this research are conclusive evidence that here is a bright zinc bath that can plate faster, brighter and more economically. The greatly increased current density range of ZS-58, combined with its exceptional throwing powers and better plate distribution at higher temperatures allows you to plate with speed and accuracy . . . *and* still maintain high lustre with no burning. Also, ZS-58 offers you—

- **BRIGHT DEPOSITS WITH SOLUTION TEMPERATURE AS HIGH AS 110°F** (with no increase in brightener consumption)
- **BRIGHTENER CONCENTRATION IS NOT CRITICAL** (eliminates production losses due to faulty additions)
- **HIGHER OVERALL CURRENT DENSITY** (more plate thickness in recessed areas . . . and higher production)

These are just some of the reasons why you should try Udylite ZS-58 Bright Zinc. Your local Udylite salesman has many more—Call him today, or write direct to:

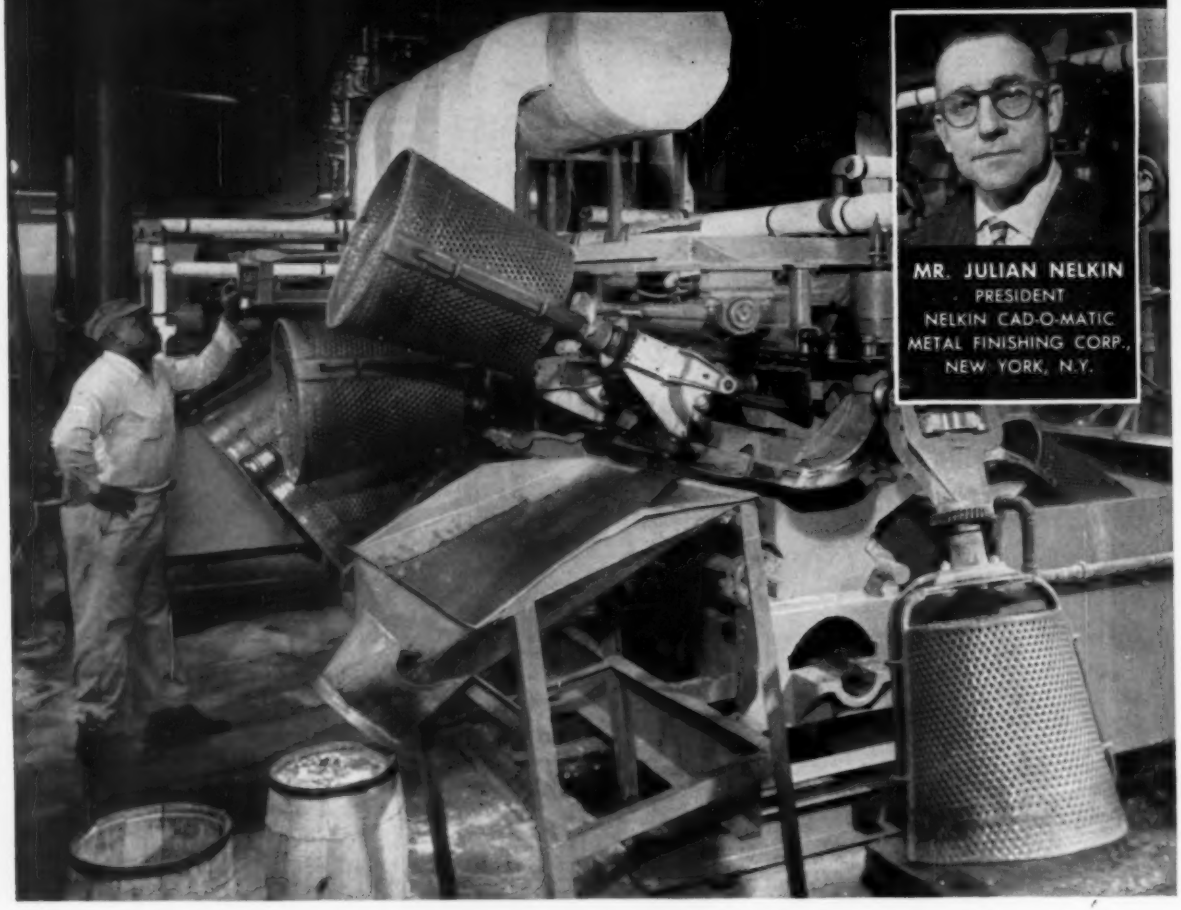


ZS-58

the udylite corporation

detroit 11, michigan • world's largest plating supplier

"THIS STEVENS AUTOMATIC BARREL PLATING MACHINE IS SAVING US $1,200 A MONTH IN CADMIUM, ALONE!" says



MR. JULIAN NELKIN
PRESIDENT
NELKIN CAD-O-MATIC
METAL FINISHING CORP.,
NEW YORK, N.Y.

Accurate plating – *not* overplating – *not* underplating . . . that's how Nelkin is saving $1,200.00 a month. Their Automatic is plating at the rate of 60,000 pounds a week. And, it's been doing it for over one year with *no* downtime whatsoever!

This is the kind of production and economy that Stevens' users have come to depend on. They know their Stevens Automatics will deliver *accurately – economically – dependably* – everytime!

If your present method of plating isn't giving you all these advantages, better call your local Stevens Representative right now! Let him show you the Stevens automatic barrel plating way to more profitable metal finishing!

Remember — When you go *automatic* . . . go STEVENS!

frederic b. **STEVENS,** inc.

DETROIT 16, MICH.

BUFFALO CHICAGO DETROIT CLEVELAND
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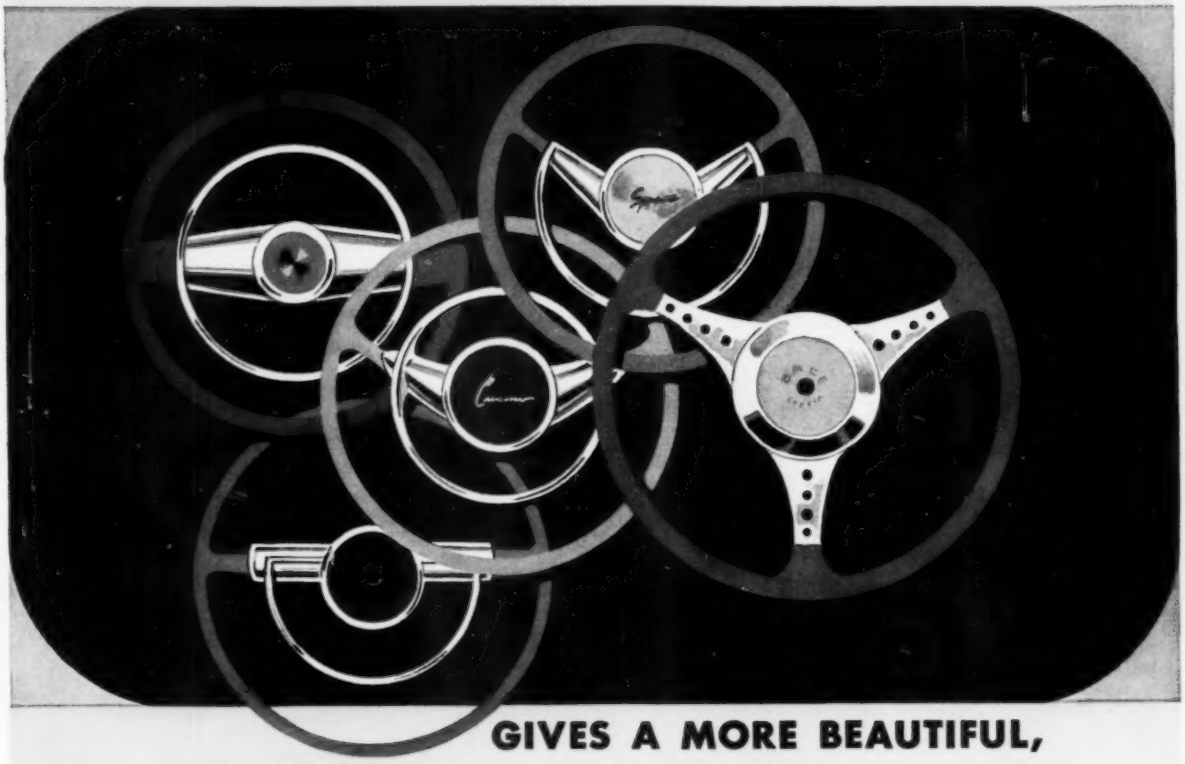
BRIGHTER COPPER, LESS TIME
with ISO-BRITE™ Addition Agents



GIVES A MORE BEAUTIFUL, DURABLE PLATE AT LESS COST TO YOU!

Whether you're producing plated parts for use on your own products or selling plated parts to volume buyers, your customers' "OK" of your plated finish is of first importance to you! Equally important is being able to do a first-rate job at the lowest possible cost. That's why the proved advantages of ISO-BRITE Copper Process are doubly important.

Now available from Allied Research — ISO-BRITE Copper Gives You:

ECONOMY—Freedom from roughness that reduces scrap. Deposit is fine grained, dense, ductile, and fully bright; requires no buffing. The high anode efficiency and wide operating temperature range, 135-165° F., are bonus qualities.

SPEED—Faster rate of deposit cuts time in tank—or gives you heavier plate for equivalent tank time.

EASE OF CONTROL—Requires less maintenance than any other copper bath. Noted for its high tolerance of organic contamination.

BEAUTY—DURABILITY—Provides fine-grained, dense deposit that assures the finest finish. ISO-BRITE beauty is more than skin deep. No rough, porous copper to try to disguise.

Teamed up with the strong advantages of ISO-BRITE Copper is the systematized approach to your copper plating problem, resulting in a sludge-free bath. This includes bagging using exclusive weaves and materials, containers of vertical wire construction and FLAT-TOP anodes.

We study your problem and make specific recommendations tailored to your installation.

For complete information or assistance, simply get in touch with the Allied Field Engineer, listed under "Plating Supplies" in your classified 'phone directory.

NOTICE: All Wagner Brothers products, facilities, personnel and know-how are now available to you from Allied Research.

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CHEMICAL AND ELECTROCHEMICAL PROCESSES, ANODES, RECTIFIERS, EQUIPMENT AND SUPPLIES FOR METAL FINISHING

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 815.

Plating klystron tube parts at Electronic Tube Division, Sperry Rand Corp., Gainesville, Fla.

How Sperry Rand cuts plating wastes from 72,000 to 400 gallons per day

After plating, parts for Sperry Rand's 20,000-watt tubes for military air-navigation systems must be rinsed in high-grade water . . . the chemical equivalent of distilled water . . . and lots of it. But one pass through, and this pure water picks up toxic cyanides and can't be used again.

Dumping 72,000 gallons of toxic rinse water every day would contaminate the plant water supply. Chemical treatment to make this rinse water non-toxic would take up too much space . . . cost too much to build and operate.

So, Sperry Rand's engineers put in a PERMUTIT ion-exchange system that *removes* the copper, nickel, silver, cyanides and other impurities so the rinse water can be re-used.

Results: Dumping was cut to about 400 gallons per day of concentrated impurities in safely disposable form. And the same Permutit units also produce the equivalent of distilled water — in volume, at low cost—for cleaner, top-grade plating.

In the same way, ion-exchange cuts costs in anodizing, bright dipping, pickling, brass etching, copper stripping. It also recovers copper and zinc from rayon wastes, concentrates uranium from complex ores, removes impurities from sugar, drugs, antibiotics.

We'll be glad to show you how ion-exchange will improve your processing and products. The Permutit Company, Dept. PL-8, 50 West 44th Street, New York 36, N. Y., or The Permutit Company of Canada, Ltd., Toronto 1, Ontario.

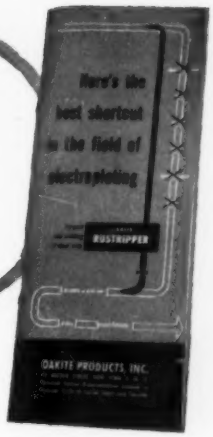
PERMUTIT®

rhymes with "compute it"

ION EXCHANGE for Water Conditioning
Chemical Processing • Industrial Waste Treatment

A division of PFAUDLER PERMUTIT INC.

Platers find many uses for chelating *cleaner



*Chelating (pronounced key-lating) cleaners convert metallic salts and oxides into compounds soluble in water.

By chelating and removing rust or heat scale at the same time that it removes oil, Oakite Rustripper combines pickling and alkaline cleaning into one operation. It also avoids disadvantages of acid pickling, such as hydrogen embrittlement and etching of machined surfaces.

Platers now use Rustripper for dozens of difficult steel-cleaning jobs. Here are some examples reported in recent weeks:

CALIFORNIA: "Rustripper has ended pickling damage such as embrittlement." (Removing oil and light rust from machined landing gears before cadmium plating.)

NEW YORK: "Now saving about $10.40 per do[illegible]n removing rust and scale and producing brighter plate." (Rustripper, added to reverse current cleaner in automatic plating machine, has eliminated separate pickling of wire towel racks before nickel and chrome plating.)

CONNECTICUT: "Rustripper added to reverse current cleaner has eliminated troublesome smut from metal furniture prior to copper-nickel-chrome plating."

NEW YORK: "Rustripper very good in barrels for derusting and brightening business machine parts . . . also for removing brown stains from parts put through black oxide treatment."

NEW YORK: "Small steel aircraft parts were embrittled by acid pickling. Rust, heat scale and stains are now safely removed by Rustripper and cyanide."

NEW JERSEY: "Only two cleaning rejects in first 15,000 parts plated." (After Rustripper was added to reverse current cleaner in automatic plater to eliminate smut from tubular steel furniture.)

INDIANA: "Rustripper is the best barrel compound we ever used for this job." (Removing tough heat treat scale from steel screws.) "Total cleaning and zinc plating time has been cut in half."

NEW YORK: "Had trouble with light rust on business machine parts before cadmium plating; also with smut left after electrocleaning. Rustripper cured both troubles."

FREE A 14-page illustrated booklet called *"Here's the best shortcut in the field of electroplating"* tells about many ways in which Oakite Rustripper can be of great value in the plating shop. Write to Oakite Products, Inc., 40 Rector St., New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE
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SELL... NI-PLEX®

All College Chemistry students, the NI-PLEX "Striplings" are traveling the country this Summer to tell you how you can make money and save money with NI-PLEX.

THE REVOLUTIONARY NEW STRIPPING BATH THAT REMOVES NICKEL FROM ALL BASIS METALS

Versatile NI-PLEX strips nickel by simple immersion from Steel, Copper, Brass, Lead, Tin, Silver, Aluminum and Zinc die casting metal — without injury to base metal.

Effective NI-PLEX strips nickel from parts containing 2 or more base metals.

Harmless NI-PLEX *contains no Cyanides, Caustics or Acids. Non-fuming.*

Non-Corrosive NI-PLEX does not pit or corrode (not even die castings).

Stable NI-PLEX is stable for long periods of time; in use or standing — at temperatures ranging from room to 175° F.

Economical NI-PLEX costs $.031 per sq. ft. to strip 0.0001" of nickel plate (calculated on drum lots).

Fast-Acting NI-PLEX Unlike other strippers, NI-PLEX components do not destroy each other.

NEW NI-PLEX PURCHASERS . . . RECEIVE AN EXCITING "FREE" GIFT. BE SURE A "STRIPLING" CALLS ON YOU. WRITE US TODAY! NO OBLIGATION, OF COURSE.

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☐ Please send us parcel post prepaid enough NI-PLEX for 1 gallon bath with Instructions.
☐ $4.00 check enclosed. ☐ $4.00 purchase order enclosed.
☐ Please send us NI-PLEX literature.

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Address .....
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HAMPSHIRE HCC Chemical Corporation

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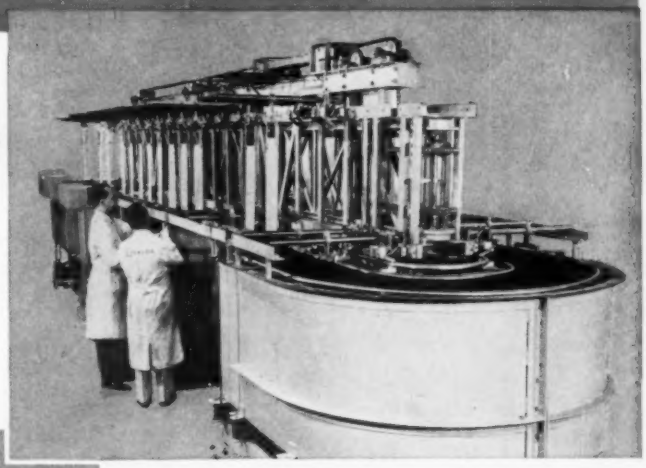
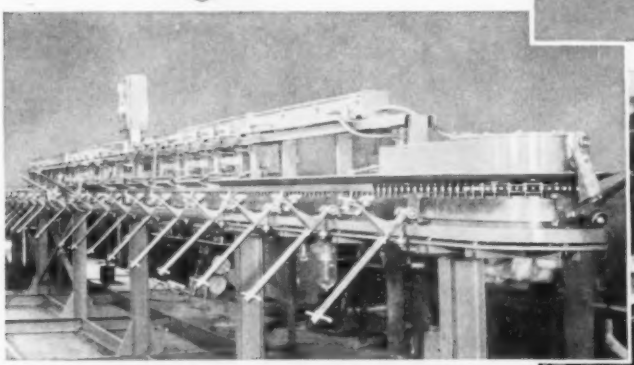
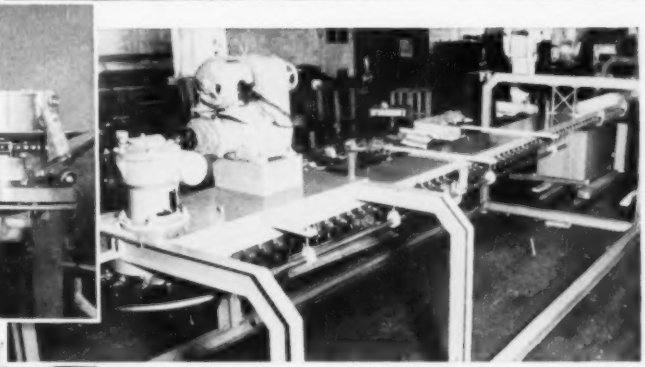
LASALCO can make your plating operation more profitable!

CYCLEFLEX Full Automatic Plating & Anodizing Machine.
Most versatile of all automatics! No overhaul or rebuilding to switch cycles—just a simple moving in positions of pick-up heads and minor changes in tank partitions. Safety controls prevent conveyor breakdowns and load dropping. Many adaptations for any requirement. Low headroom.



SELECT-O-MATIC Multiple Process Plater.
Handles 2, 3 or more process cycles at one time! While loading, operator merely turns dial to select desired cycle for individual racks and the rest is fully automatic! One operator can handle several different processes simultaneously. Saves investment in a variety of machines—reduces floor space requirements—cuts maintenance to a minimum.





DAW JUNIOR CONVEYOR
Fully automatic handling of individual parts. Tailor-made for any production output and any cycle. Tank to tank work transfers raise carriers to above horizontal to prevent solution carry-over, and eliminate air or gas pockets in work. Automatic unloading if work permits.

DAW SENIOR CONVEYOR
Custom-engineered, fully automatic, for any job, any cycle, any production requirement. Transfers from one tank to another raises work from vertical to above horizontal to facilitate drainage, prevent solution dragout. Handles racks for all sizes and quantities of parts. Automatic unloading unless shape or work size is too large.

Write For Descriptive Literature

● Lasalco has the sound experience and proved ability to analyze your exact needs, and to give you equipment that will increase output do it better, faster, and far more profitably. Phone or write for the services of a Lasalco engineer.

LASALCO, INC.

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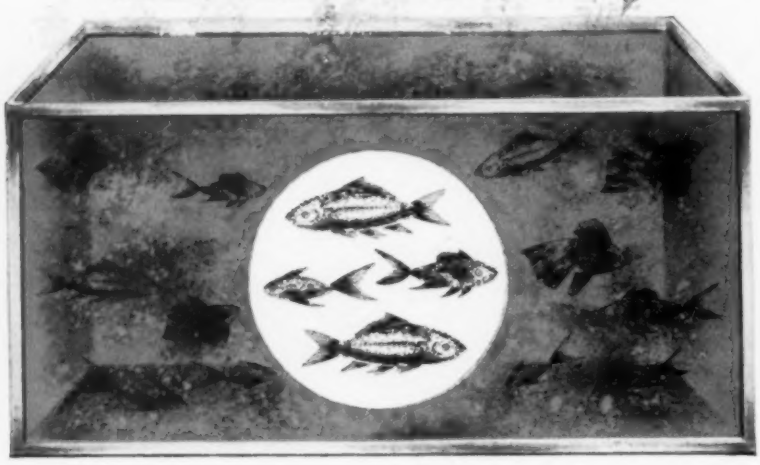
PLATING PLANT PUTS GOLDFISH ON THE PAYROLL!

They prove the purity of Nalcite treated plating waste



In one of the nation's most modern plating plants, Nalcite Cation and Anion Exchange Resins hold down the cost of demineralizing waste water . . . with contented goldfish proving the effectiveness of treatment. Chrome is recovered . . . demineralized water is recirculated as high quality rinse water . . . and a waste disposal problem is solved. The control panel actually contains a goldfish aquarium through which an effluent sample flows . . . and the lively fish are proof that the treated waste is *safe!*

More and more industries are using these amazingly versatile Nalcite microspheres . . . for faster, cheaper production of demineralized water used in boilers, reactors, rinses . . . for separation and purification of rare earth metals . . . for disposal of dangerous wastes. There are other uses, too, and Nalco welcomes the opportunity to help you utilize them.

NATIONAL ALUMINATE CORPORATION

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Nalco® **PRODUCTS...** *When you use Nalcite Resins, you take advantage of Nalco's long and broad experience in water and process technology.*

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PIONEER IN

CHROMATES

NOW OFFERS DECORATIVE

COLOR

ON ECONOMICAL

ZINC

At long last you can now secure beautifully bright, gleaming colors from a simple LUSTER-ON chromate dip process for your zinc plated small parts.

These are not just spotty identification colors. These are scintillating golds, yellows, blues, greens, violets, reds, brass and copper hues that will add glamor and sales appeal.

Especially Brilliant on Wire Goods

Be the first in your field to offer this sales booster. Write or wire today for the full story on low-cost LUSTER-ON COLOR.

Samples Gladly Processed Free

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THE *Chemical* CORPORATION

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THIS COATING HAS "LIFE INSURANCE"

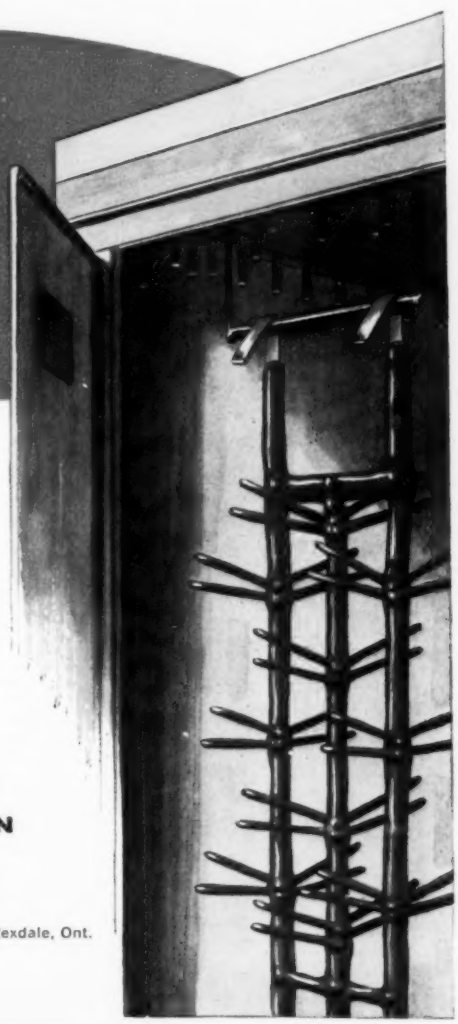
...that's one more of the advantages of Unichrome Coating 218X

Racks are ready for long life under roughest service conditions with Unichrome Coating 218X. So tough is this quality plastisol rack insulation, that damage is a rarity. It won't chip, crack, tear . . . is highly resistant to abrasion.

But even if accidental damage does occur, coating life is still not shortened. Coating 218X can be patched and rebaked with no loss of toughness or resiliency. Like new, the rebaked coating will continue to survive strongest plating and cleaning operations, including vapor degreasing cycles.

Platers have been saving maintenance money for over 10 years now with Coating 218X . . . first in the field. They have proved for themselves that *using the best quality at the outset saves most money in the long run.* Send for more details.

Are you using the rack coating that gives you ALL FIVE?



1. *Built-in cure indicator assures maximum performance*
2. *No contamination of plating baths*
3. *Ability to be rebaked for patching*
4. *Nationwide set-up of expert applicators*
5. *Highly qualified technical service.*

UNICHROME

First name in plastisols for all plating purposes . . .

METAL & THERMIT CORPORATION

Member, Vinyl Dispersions Division of the SPI

GENERAL OFFICES: RAHWAY, NEW JERSEY

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A smooth, flawless finish in this mold plated by Nutmeg Chrome Corp. assures an equally flawless finish in molded melamine dishwear. Nutmeg considers the finish of this force and cavity, hard-plated with Mutual Chromic Acid, "about the highest lustre obtainable on any surface."

For perfect plating every time use Mutual *LOW SULFATE* Chromic Acid

When only a perfect finish will do, the purity of Mutual Chromic Acid is one safeguard against plating difficulties . . . and against expensive rejects!

Mutual Chromic Acid is always 99.75% pure – or better. Sulfate content never exceeds 0.1%. Rigid quality control by Mutual insures that the chromic acid you get is always the same. This makes it easy for you to control accurately the acid-sulfate ratio of your plating bath.

To learn more about these and other advantages of Mutual Chromic Acid, send today for "Chromium Chemicals." This booklet gives full technical information on the entire line of Mutual Products. Mutual's Technical Service Staff will also be happy to offer help and information at any time.

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Sodium Chromate
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Allied Chemical

MUTUAL chromium chemicals are available through dealers and **SOLVAY** branch offices located in major centers from coast to coast.

Solvay Process Division
Dept. 8, 61 Broadway, New York 6, N. Y.

Please send:

☐ Bulletin 52—Chromium Chemicals: Their History, Properties and Uses.

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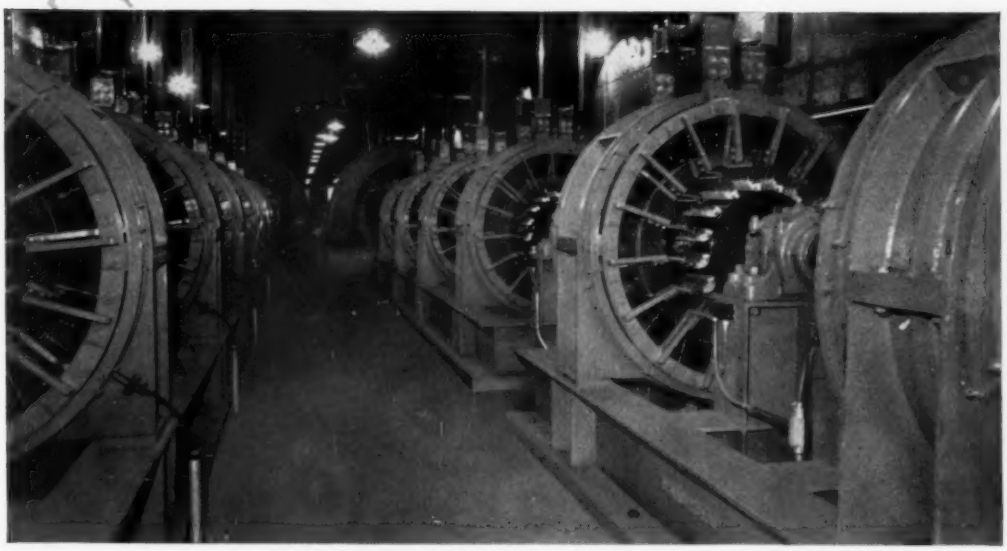
DEFEAT THE HEAT

proof that motor generators are your best investment in power conversion equipment



Youngstown Sheet and Tube Co. *beats the heat* with four 72,000 ampere, 20 volt Chandeysson M.G. Sets. Each is driven by a 2,500 HP, 300 RPM synchronous motor.

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Generators are built to take the heat, heavy punishment under severest operating conditions

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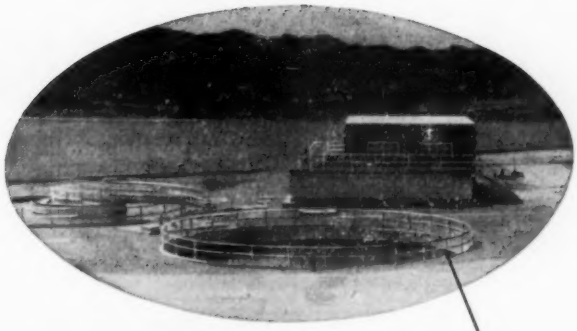

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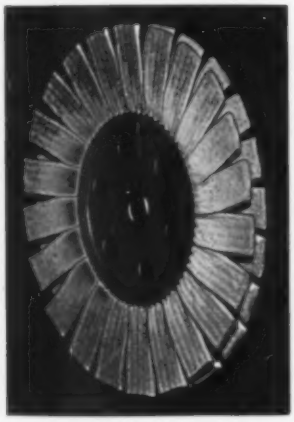

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and/or buffing
parts having contoured
surfaces

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row of extra heavy
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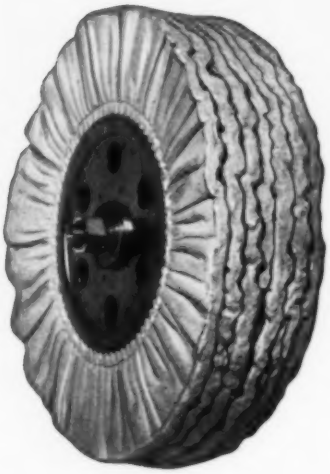
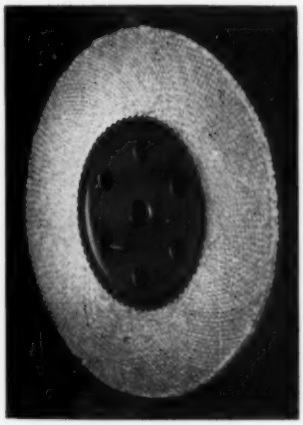
to center plate





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on plain or
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American Society for Testing Materials 1957 Proceedings, Volume 57, 1430 pp. AES members $10.80; non-members $12.00.

This book records the ASTM technical accomplishments of the year, includes reports and papers together with discussion offered to the society during the year and accepted for the proceedings. The volume includes the summary of proceedings of the ASTM 60th Annual Meeting and the summary of proceedings of the Philadelphia Spring Meeting, listing by title and author the programs for each session.

The annual president's address by R. A. Schatzel, "Our Expanding Technology and ASTM," emphasizes the Society's responsibilities in areas for contributions to the national technical welfare.

The annual report of the board of directors highlights matters administrative, technical, and financial. Included are records of all meetings held by the society and its districts, information on membership gains, publications, honors, and awards, and other matters of interest. There are 66 reports of technical committees which, together with appendices provide useful information as do the 52 technical papers and discussions on a wide variety of subjects pertaining to research and testing materials.

In addition to the reports and technical papers, many of which have been given at the national meetings and some of which have been preprinted, the proceedings contains much discussion not previously published.

Development of Electroplating Processes to Eliminate Hydrogen Embrittlement in High-Strength Steel. by J. E. Chilton, Stanford Research Institute for Wright Air Development Center, U. S. Air Force. Jan. 1958. 84 pp. Order PB 131721 directly from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., $2.25.

This report describes the properties of the electrodeposition of cadmium on a high-strength, aircraft quality steel. Properties data were drawn from an attempt to plate cadmium on steel without hydrogen embrittlement. The static sustained load beam test was used for evaluation of the effects of hydrogen embrittlement caused by plating cadmium on SAE 4340 steel from different baths and by different techniques. A sulfamate bath, a perchlorate bath, and cadmium-tin alloy plates were found to give deposits which showed no hydrogen embrittlement. Copper plated from a pyrophosphate bath and a nickel-tin plate from a fluoride bath also produced no embrittlement. Techniques of degreasing steel bars with trichloroethylene, anodic cleaning in alkaline solution and vapor, and sand blasting were evaluated as the best methods for surface cleaning and descaling without embrittlement.

Phosphating Treatments—Patent Literature Survey by E. C. Tinsley, Rock Island Arsenal Laboratory, U. S. Army Ordance Corps. Apr. 1957. 148 pages. Order PB 131356 directly from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., $3.75.

This volume was compiled as an aid to chemists and engineers concerned with production or selection of effective phosphating coatings for metals. Data are given on 522 patents relating to the phosphating process. Each entry is abstracted.

DUE DATES FROM AES BRANCHES

OCTOBER 15	Return Sheets from accredited Delegates covering Branch Nominations for AES Scientific Achievement Award.
NOVEMBER 3	Return Sheets signed by both the Branch President and Branch Secretary designating and certifying the Branch's duly elected Delegates and Alternates for Credentials Committee accreditation. The tenure of these Delegates will be from the first Branch Meeting following the 1958 Cincinnati Convention to the first Branch Meeting following the 1959 Detroit Convention.
DECEMBER 1 (September if possible)	Per Capita Taxes for all Branch Members in good standing covering the 15-month period from April 1, 1958 through June 30, 1959.

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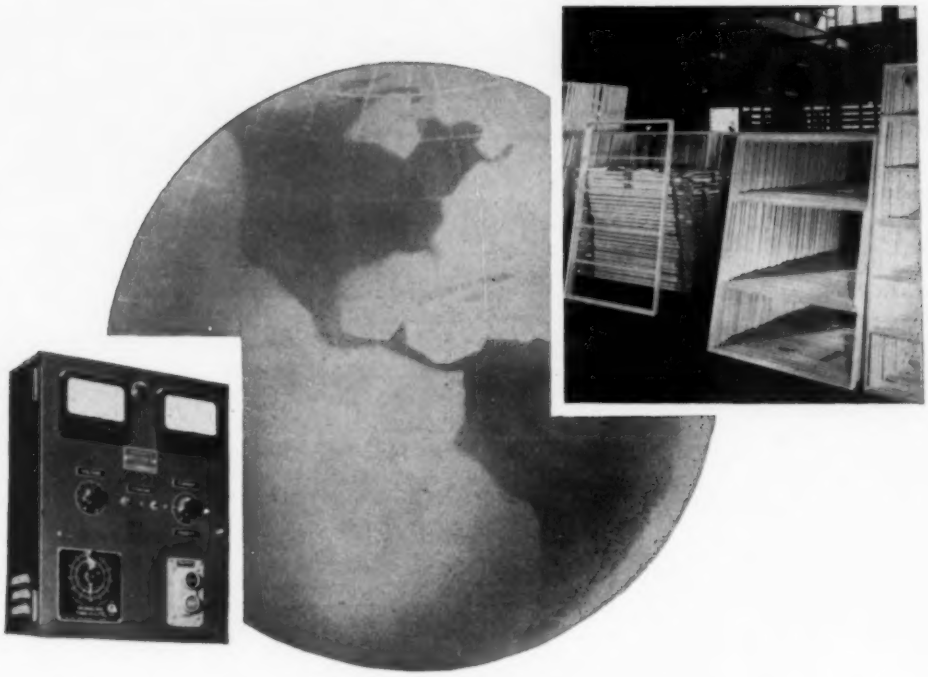

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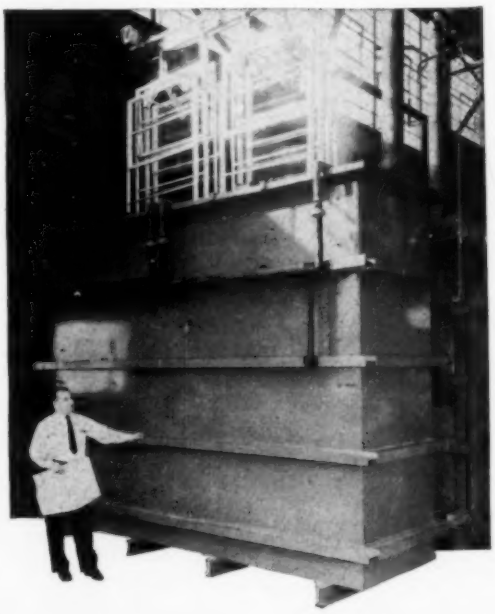

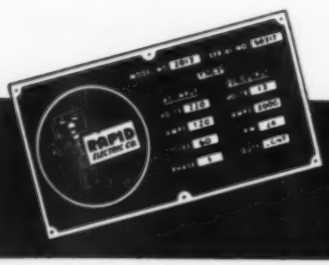

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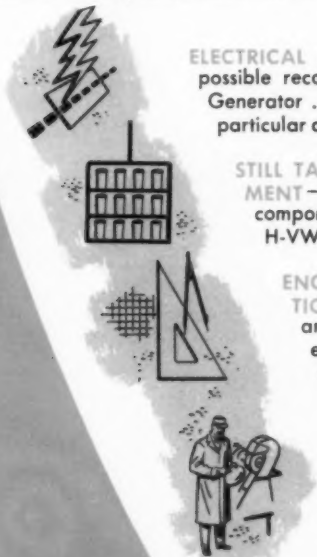
No matter what your aluminum finishing problem or need, you'll find the answer at H-VW-M... because it is the one company combining a complete engineering service with a complete line of equipment and supplies!



ELECTRICAL EQUIPMENT — Want the best possible recommendation of a Rectifier . . . Generator . . . or Control Equipment for your particular operations? Page 2 tells how to get it.

STILL TANK OR FULL AUTOMATIC EQUIPMENT — Whatever your need — from a single component to a complete, integrated system — H-VW-M supplies it . . . Page 3.

ENGINEERING SERVICE AND INSTALLATION — H-VW-M engineers and technicians are anodizing equipment specialists, with years of experience. Page 3 tells why these H-VW-M services mean greater efficiency and savings in your plant.

ALUMINUM FINISHING SUPPLIES — Page 4 shows how H-VW-M research has resulted in new compounds, improved buffs and cleaners to make aluminum finishing easier, better.

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H-VW-M is the only manufacturer of both Germanium and Selenium Rectifiers *and* low voltage, direct current Motor Generator Sets for the metal finishing industry. This thorough experience in every phase of low voltage power generation and rectification means that when you bring your power problems to H-VW-M you're sure to get the perfect equipment recommendation.

Self-Contained Rectifier with Tap Switch Control

Remote Controlled Rectifier with Tap Switch Control

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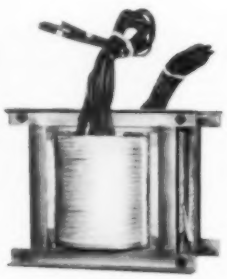
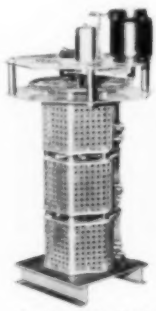
Highest quality and efficiency, flexibility, economy and low maintenance are the characteristics combined in H-VW-M's full line of both Germanium and Selenium Rectifiers. 6 to 48 volt units—both remote and self-contained—provide the exact direct current low-voltage and high amperage required in aluminum anodizing. The widest possible choice of controls and control combinations is available. Such devices as manual or motor operated tap switch controls, continuously variable auto-transformers and saturable core reactors are used with or without supplemental controls to provide automatic voltage stabilization, automatic constant current as well as automatic programming.

Write for Bulletin ER-108, which gives further information about Rectifiers and Controls, plus useful control application suggestions.

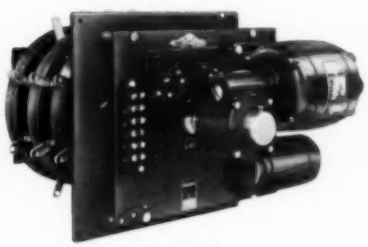
Manual Tap Switch Control



Saturable Core Reactor



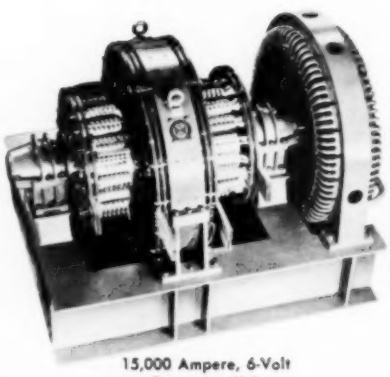
Continuously Variable Auto-Transformer



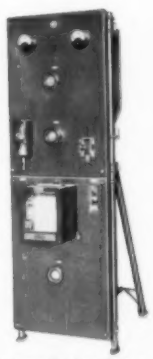
Motor Operated Tap Switch Control

Generators . . . and Controls

H-VW-M Motor Generators designed especially for metal finishing operations are built in sizes up to 50,000 amperes, and accessory equipment includes a full line of controls and control panels to cover any desired control function. Easy-to-maintain H-VW-M Motor Generators have exceptionally rugged and practical construction features insuring maximum performance and life. Standard voltage ratings range from 6 to 50 volts, and include the 18 and 24 volt units usually required for sulphuric acid anodizing, plus the 40 and 50 volt units used in chromic acid anodizing. Write today for 24-page Bulletin G-104, covering in detail all H-VW-M Generators.



15,000 Ampere, 6-Volt Generator Unit



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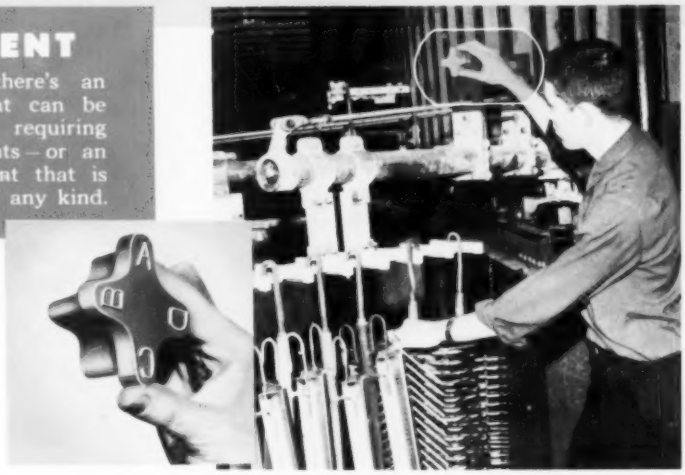
Supplies, Equipment and Services Add Up Simplicity of Operation in Your Plant

PROCESSING EQUIPMENT

Whatever your anodizing procedure, there's an H-VW-M Full Automatic Conveyor that can be adapted to any production application requiring automatic cycling of individual treatments – or an H-VW-M Tank with accessory equipment that is perfectly adapted to still tank methods of any kind.



Workman "dials" desired cycle in refrigerator plant. Parts will by-pass or lower into baths as dial setting dictates.

Automation in Metalfinishing— *Full Automatic Conveyors with Dial-A-Cycle*

H-VW-M's new DIAL-A-CYCLE system automates nine or more complete metalfinishing processes on a single anodizing or electroplating machine. This revolutionary by-pass mechanism can be used on any metalfinishing installation for anodizing, electroplating, or similar processing. It is especially useful and effects substantial cost reductions when a variety of parts requires several different processes or colors.

DIAL-A-CYCLE, as the name implies, is controlled by a simple dial setting. The dial is mounted on the carrier arm that carries the parts through processing tanks. It is set by the machine operator for the processing steps through which each load of unfinished parts is to move. Automatic conveying then takes over, lowering the parts into the required tanks and bypassing others.

Different products, requiring different anodizing cycles, may be processed at the same time, with the same equipment. DIAL-A-CYCLE gives you new versatility while reducing operating, labor, and maintenance costs. Close, automatic control of transfer and immersion periods improves quality.

DIAL-A-CYCLE is the newest of many types of conveyors and equipment H-VW-M supplies to aluminum finishers. H-VW-M also designs, manufactures, and installs return-type conveyors . . . elevator conveyors . . . straight-line conveyors . . . and others. For a complete description of all types, write for Bulletin FA-105.

Tanks and Equipment

At H-VW-M – the plating and anodizing industry's workshop—you'll find tank equipment for every phase of your work. For chromic acid anodizing, H-VW-M double electric welded unlined steel tanks are offered, along with steel coil equipment for cooling and heating. The entire system is H-VW-M designed, supplied and installed. For sulphuric acid anodizing, lead-lined steel tanks, plus the necessary cooling coils and air agitation assembly, are supplied. Tanks are fabricated from hot rolled steel, stainless steel, and aluminum. Other types of tanks are also available. Bulletin No. T-108 gives full particulars about this important H-VW-M equipment. Every conceivable type of auxiliary equipment is engineered and supplied, according to customers specifications, including a complete packaged refrigeration system for anodizing solutions.

And H-VW-M's Engineering and Installation Service

Anodizing problems of *any* kind? H-VW-M is prepared to set up your entire anodizing system from beginning to end—a system made up of components scientifically engineered to work together with utmost efficiency. Because of this, and because of H-VW-M's continuing research and development in every aspect of the anodizing picture, you can be confident that the recommendation you receive from H-VW-M is the very *best*.

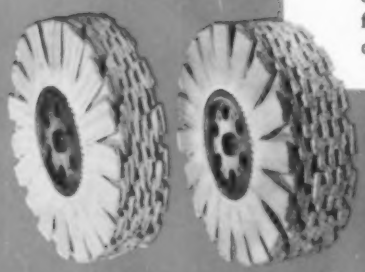
What's more, if requested, H-VW-M sees to it that the equipment you buy is H-VW-M *installed*. This means perfect, efficient operation from the start.

Add to this the fact that an H-VW-M technical representative—ready to serve you—is no further than your telephone. These representatives serve in principal cities across the nation. Get to know the one nearest you. He can help you get the most from your aluminum finishing equipment and supplies.

TURN THE PAGE FOR ALUMINUM BUFFING AND CLEANING SUPPLIES

ALUMINUM BUFFING AND CLEANING SUPPLIES

Since aluminum came into its own after World War II, considerable H-VW-M research and development work has been devoted to the perfection of buffs and compounds suiting the unique physical characteristics of this popular light metal. When long-wearing H-VW-M Buffs are used in conjunction with H-VW-M compounds especially formulated for aluminum finishing, you have the perfectly balanced combination for economy, efficiency and quality performance.

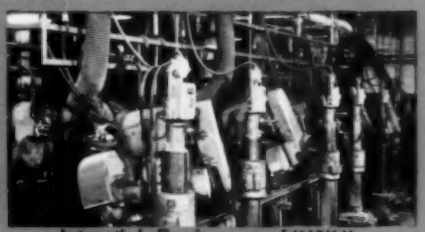


Buffs

Nowhere will you find a wider selection of the buffs you need for preanodizing operations than at H-VW-M. Whether you're looking for a super-heavy-duty buff like new steel-centered Ruff-L-Buffs (which are available untreated, or Binderized® for extra long wear) medium duty buffs like Triplex Buffs, or a buff for medium-to-light service such as the Full Disc Buff, you need look no further than H-VW-M. The full H-VW-M line also includes new Tufta-Flex Buffs (cloth tufts) and Sisal-Flex Buffs (with sisal-centered tufts).

Among this array you'll find the exact buffs for your aluminum finishing needs. Every one is characterized by first quality, uniform new material of close weave and good weight . . . tight sewing with heavy thread . . . and proper balance. Write for 12 page Bulletin B-103, which describes H-VW-M's entire buff line.

Hand buffing using H-VW-M buffs, compounds.



Automatic buffing by means of H-VW-M Liquimatic System.

Compounds

For heavy duty cutting, H-VW-M Liquid Tripoli Compounds 303 and 420 were developed, and are now widely used in the cooking utensil industry. For the appliance, storm window, construction materials and automotive fields, H-VW-M's new Liquimatic Liquid Compound No. 728 has proved especially successful, giving excellent cut, while leaving the surface with deep, high color.

H-VW-M Bar Compounds also find broad use in aluminum finishing. A variety of tripoli bar compounds are offered in varying consistencies to meet all cutting requirements. For cut and color, special white compounds are available. And for high color, several new H-VW-M aluminum oxide compounds—No.'s 6-B-168, 6-B-72 and 8390—give unusually good results. Write for Bulletin CO-103.

Cleaners

H-VW-M devotes constant research to the subject of cleaners in its search for ever better products in the aluminum finishing field.

Matawan Cleaners are designed specifically to give superior results in soak cleaning, power spray operations, oxide removal, and for special aluminum cleaning and etching operations. Of particular interest is H-VW-M's 85S Cleaner, which prevents scale formation, thus keeping coil and tank walls scale free. This unusual aluminum cleaner leaves an extremely bright surface, and, because of its built-in regenerator, makes maximum effective use of caustic in the bath.

In line with its desire to supply the exact cleaner for the job, H-VW-M offers its extensive laboratory facilities where circumstances demand a special cleaner.

When you think of aluminum finishing equipment and supplies—think of H-VW-M first. Buying from one dependable source . . . H-VW-M . . . means one company assumes full responsibility—your guarantee that you're getting the best . . . in products . . . in performance, in *extra* service.

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Your H-VW-M combination—of the most modern testing and development laboratory—of over 90 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

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VARIATIONS IN THE DESIGN OF PLATING WASTE TREAT SYSTEMS

by ROBERT DVORIN*

Although basic chemical processes remain the same for treating plating wastes, factors at individual plants can lead to variations in system designs which simplify operations, save on chemical and equipment costs, and reduce requirements for operator time and attention.

INTRODUCTION

THE WASTES FROM PLATING OPERATIONS are relatively few in number. They usually involve some or all of the following: hexavalent chomium, cyanides, and acids and alkalis. While the chemical treatment of these wastes is essentially the same regardless of the size of the plant or the concentration of the wastes, treatment equipment and plant design can vary considerably from one plant to another depending on a variety of factors. Variations in design frequently result in simpler operation, lower requirements on operator time and attention, lower chemical requirements and other important benefits. This is true for both recovery and disposal problems. However, this article will deal exclusively with the disposal aspects of plating waste treatment.

Factors Affecting Plant Design

Most waste treatment plants in the plating industry require reduction of hexavalent chromium to trivalent chromium; oxidation of cyanides to either cyanates or CO^2 and nitrogen; pH adjustment for these two streams and the acid-alkali, and precipitation of metals in all three wastes. To simplify operation and insure adequate treatment of each stream, it is usual practice to treat chrome separately from cyanide, and acid-alkali together with the treated chrome and cyanide streams. The treated wastes are then passed to a clarifier for removal of precipitated and suspended metal hydroxides.

From this description it can be seen that the basic equipment requirements and plant design will depend first of all on the number of wastes to be treated. However, other factors can have important effects on requirements and design. These factors are as follows:

Concentration and Flow. The equipment and controls necessary for satisfactory treatment of plating wastes can vary considerably depending on the nature of the concentration and the flow of each waste. Usually, rinses require continuous treatment while baths are treated by batch. However, a small bath dump can sometimes be collected in a tank and bled into the rinse stream, so that it does not require separate treatment by batch. Even low flows of a running rinse are sometimes easier to treat by batch. For example, to treat a low flow of cyanide by continuous treatment requires instrumentation similar to that used for larger flows. A simple batch method would eliminate the need for these controls.

State Regulations. Many states have laws regulating the treatment and discharge of industrial wastes. Some states will only accept batch treatment of cyanide wastes. It has been found in these cases that modifications of the batch system may be used which can result in a simpler, quicker operation and reduced plant size. Frequently, acceptable *p*H levels are also stipulated by the states, and this can affect chemical requirements.

Plant Requirements. Certain aspects of equipment design can depend on considerations of time and labor. Where required, automatic features are supplied to reduce operator attention and also the amount of knowledge required by the operator to run the plant. Also, time may be a factor in the recommendation of either batch or continuous treatment on certain processes.

Housing. The amount of equipment required can be affected by the physical layout of the waste treatment area. In most cases it is necessary to provide a sheltered area within the plant or a separate building to house chemical storage facilities, chemical feeders and instrumentation. The waste treatment area can generally house various surge and treatment tanks by providing tankage built into the basement of the plant or the waste treatment building. This would utilize the structure of the building as part of the wall for concrete tanks.

Taking all these factors together, it can be seen that the equipment manufacturer, the consulting engineer and plant personnel must work together closely in the initial design stages of the job to assure an integrated waste treatment plant. Such a plant will utilize the least capital investment and place the smallest possible burden on operator time and attention.

CASE HISTORIES

The three case studies discussed below show how certain determining factors are taken into account in designing waste treatment systems. Each of the plating plants cited desired to treat either chrome, cyanide, acid and alkali, or a combination of these wastes. None of the plants was sufficiently large or complex as to require a full-time operator so that a worker taking time from production would have to perform whatever operations were necessary. Therefore, the key to all three plants was a simplicity of operation with some degree of automatic control.

The problems encountered at these three plating plants are fairly typical of those found at many plants across the country and an insight into the solution of these problems

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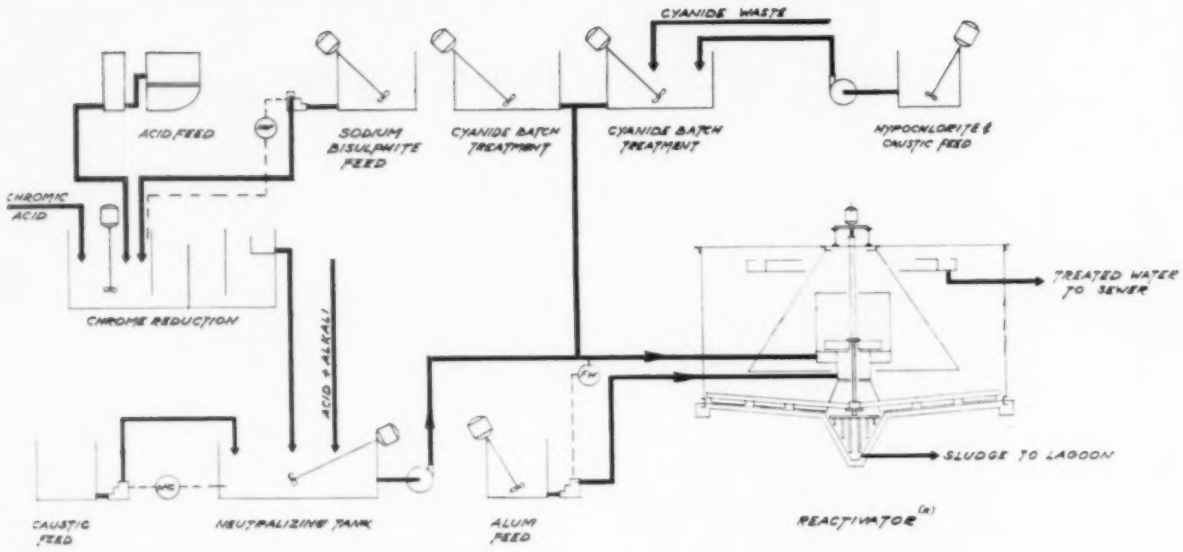

Fig. 1. Simplified flow diagram of waste treatment system for Plant A.

will indicate some of the current practices in the design of waste treatment plants for the plating industry.

Plant A

Plant A manufactures and plates electronic components. Wastes include cyanide, chromate, acids and alkalis. At first the plant thought that very simple equipment was all that was necessary to handle the job—perhaps a few tanks and mixers. However, in preliminary talks it was learned that the plant had no skilled personnel with time to run an essentially manually-operated plant. As plant management became aware of the systems and methods available to them, they agreed to a more complex control set-up which provided the operating simplicity they desired.

A flow diagram of the waste treatment system as it is now operating is shown in Fig. 1. Because of the quantity of chrome to be treated, continuous treatment was employed. This required a baffle tank with a mixing compartment on the inlet side. Sulfuric acid, purchased in drums, is pumped into the mixing compartment by a metering pump. Flow of chromate was fairly constant so no *p*H control was required for this part of the system. The acid pump is set manually and maintains the *p*H in the right range for optimum chrome reduction using sodium meta-bisulfite.

The pump metering this chemical is controlled by an oxidation reduction controller. This feeds the proper quantity of chemical to reduce hexavalent chrome even though there are fluctuations in the concentration. The chrome wastes then flow by gravity to the neutralizing tank where they are joined by acid and alkali. A *p*H controller feeds caustic in the proper quantity to raise the *p*H of the combined wastes to 8.5.

Cyanide is treated in a batch tank. Caustic and sodium hypochlorite are pumped into the tank in a quantity determined by simple tests made by the operator. When the cyanide has been destroyed it is pumped into the inlet line of the final unit, a clarifier. This unit* (Fig. 2) is a high-rate, upflow, solids-contact unit which incorporates the functions of coagulation, flocculation, sedimentation and sludge removal in a single compartmented tank (Fig. 3). In the reactivating unit* the waste-bearing solution is treated with alum and an organic coagulant to clarify the water. The treated water is discharged and the sludge is blown down to a series of lagoons for drying. Static head in the unit is used instead of a pump to transfer the sludge to the lagoons, 200 ft away.

In addition to minimum operator attention, Plant A also desired that the waste system be available for 16- or 24-hour operation, even though it would normally be run on an 8-hour basis. This was provided by the continuous treatment for the chrome and acid-alkali wastes. Consequently, no matter how many hours the plant operates, the waste treatment system is adequate as designed. The cyanide system with its two tanks is both adequate and safe. Each tank is large enough to hold an 8-hour flow, while treatment itself takes a maximum of 2 hours to complete. It is a simple matter to pump the treated cyanide waste into the clarifier* in 4–6 hours, thereby allowing the tank to be emptied in time to take the flow when the filling tank is filled.

At Plant A, chemical storage, chemical feeds, controls and treatment tanks are all housed in a single building separate from the manufacturing facility. It is only necessary for an operator to make a periodic check to see that all chemicals and controls are operating properly. A level control in the cyanide tank allows the operator to initiate the transfer of treated cyanide to the clarification equipment. The transferring pump shuts off automatically.

Plant B

Plant B manufactures electrical controls requiring chrome plating. The only wastes from the process are chromate

*Graver Reactivator®

acid and acid-alkali. The flow is steady and therefore treatment of the wastes is continuous. The chromic acid wastes vary somewhat in concentration during the working day; acid waste varies considerably. Fig. 4 is a flow diagram of the waste treatment system.

So that they can be treated together, the combined acid wastes are blended in a 4000-gallon receiving well with sufficient sodium meta-bisulfite to reduce the hexavalent chromium under the worst conditions. A *p*H control automatically meters sulfuric acid into the well to maintain an optimum *p*H for chromium reduction. A high-speed agitator continually mixes all the wastes coming into the well.

The waste solution, now containing acid, trivalent chrome and various other metals, passes over a weir into a 1000-gallon hold-tank where it is mixed with the alkali wastes. Lime is fed as required by a *p*H controller to keep the *p*H at 8.5 and precipitate the metals. The neutralized waste solution, containing precipitated metallic hydroxides, then passes to a Reactivator where alum is fed to aid coagulation and sedimentation of these metallic hydroxides.

Two pumps are provided to transfer the waste from the alkali receiving well to the clarifying unit. Under the lower flow conditions, only one pump is in operation. When a level control senses higher flow rates (over 200 gpm) the second pump automatically turns on. This compensates for fluctuations in flow rates.

Alum is fed at a varying rate depending on the flow rate of the water to be treated. A venturi-type flow meter records flow and operates the alum feeder in relation to flow. As in plant A, clear water leaves the top of the clarifying unit and is discharged to waste. Precipitated metal hydroxides are concentrated in the bottom of the unit and discharged to a lagoon.

Plant B's system is extremely simple to operate, even though it did not require very complex instrumentation.

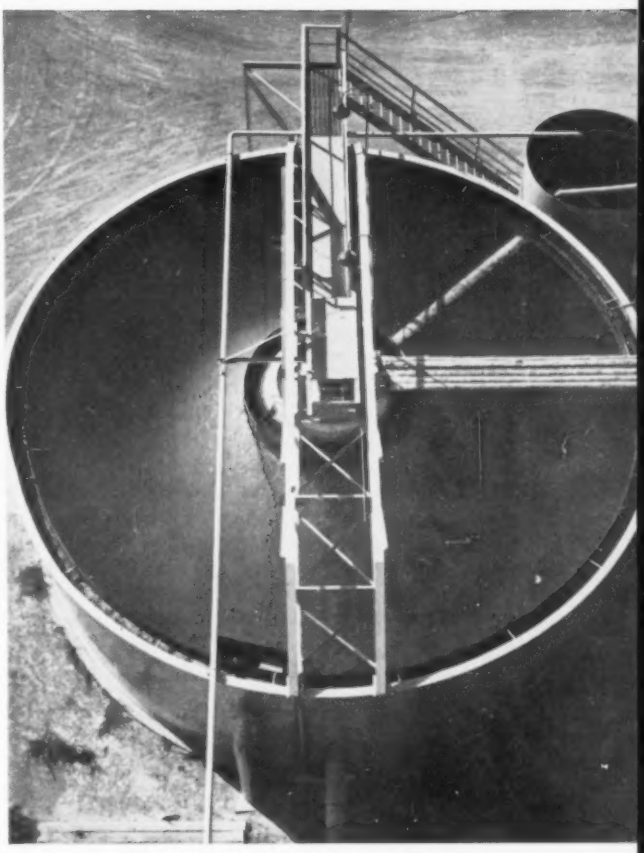

Fig. 2. View looking down into a typical clarifier.

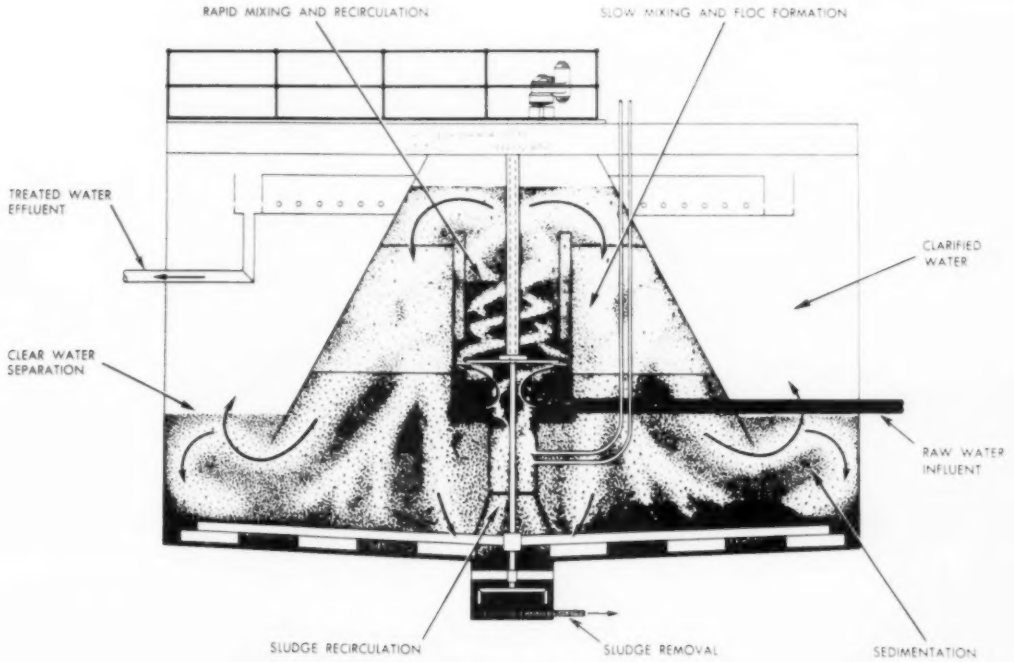

Fig. 3. Cut-away view showing flow pattern.

The only work the operator has to do is to make an infrequent check at the receiving wells to ascertain proper treatment and to keep the chemical feed hoppers supplied. Other than that, the system runs by itself.

Plant C

In plant C, chrome, acid-alkali and cyanide wastes result from a tumbling barrel plating operation. The bath and rinse waters—about 150 gallons—are passed to the treatment system once every 30 minutes—the time it takes to plate one barrel. Even though the flow is intermittent, the concentration of chromic acid and *p*H is relatively constant. The treatment plant is shown in Fig. 5.

To treat the wastes, a 300-gallon batch tank with 2 level probes is used. When a 150-gallon batch is dumped, the first level probe actuates positive displacement metering pumps which feed sulfuric acid and sodium meta-bisulfite. The pumps are manually set and then operate by timers, with the first probe initiating the timing cycle. The first probe also initiates another timer which controls the timing cycle of a mixer. Chemicals are introduced and the mixer operates for 10 minutes and stops. After this treatment an air operated dump valve on the batch tank is opened automatically and the waste solution is discharged to a lined, 780-gallon concrete pit.

If another 150-gallon batch should be dumped into the 300-gallon batch treatment tank before treatment has been completed on the original batch, a second level probe takes over and repeats the timing cycle of chemicals, mixer and dump valve. In this way, the wastes are treated automatically regardless of the cycle in the plating room and without the need of expensive oxidation reduction recorders and indicators and the necessary controls to operate the chemical feed from these controllers. Adequate retention time is provided in the concrete pit so that there is ample time for treatment of the second batch.

The concrete pit is located in the basement of the treatment building as is the alkali receiving well. Contents of the pit overflows into the well which is lined and has a common wall with the pit. The dissolved trivalent chrome and sulfuric acid blend with the alkali wastes. Lime, automatically controlled by a *p*H controller, is added to raise the *p*H high enough to precipitate the chrome. After high-speed agitation, the solution of treated wastes, consisting of suspended metallic hydroxides at a *p*H of approximately 8.5 is pumped to a Graver Reactivator. Treatment similar to that which has already been described takes place.

Cyanides are collected in a basement tank during the 8-hour working day. A standard chlorine solution is used to determine the proper amount of chlorine feed. When the operator has determined the quantity of cyanide wastes in the tank, he consults a chart* which tells him how many gallons of sodium hypochlorite (laundry bleach) should be added. Just before the operator is ready to leave for the night, he adds the bleach and turns on the mixer. A timer shuts off the mixer after one hour.

In the morning, the operator checks the treatment to be sure it has been effective. This done, he discharges the cyanide wastes into the clarifying unit, which already contains the other wastes. Copper in the cyanide is precipitated as copper hydroxide and is discharged with the other sludge.

CLARIFICATION IN WASTE TREATMENT

Before concluding, a few points should be made about the clarification unit described above and used in all three waste treatment systems. This unit is in no way different from

*Supplied by Graver with the treatment system.

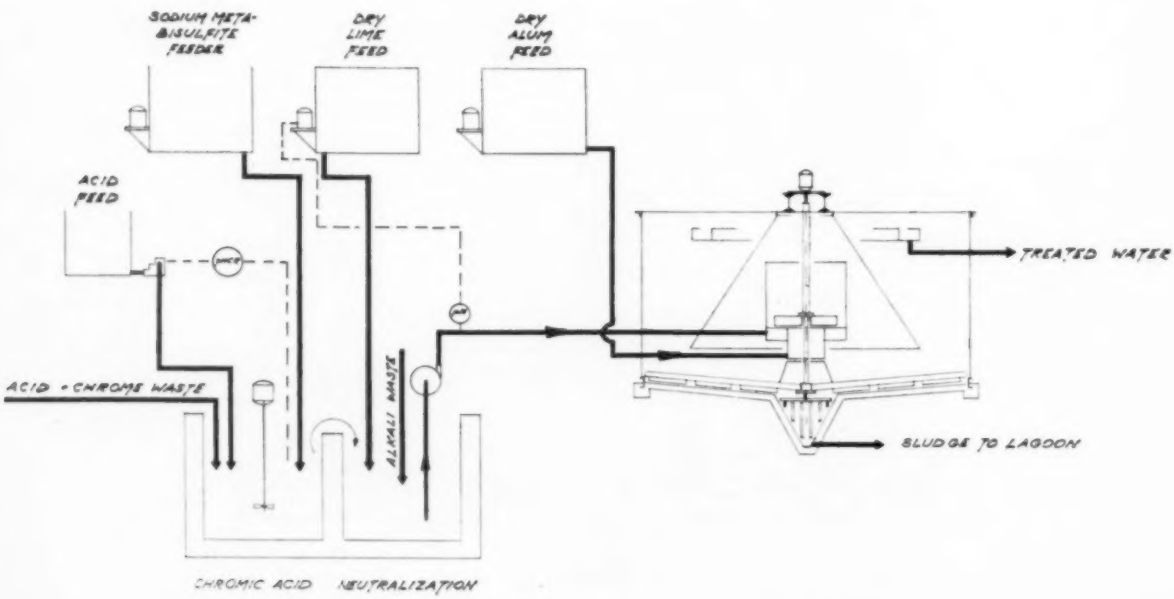

Fig. 4. Simplified flow diagram of waste treatment system for Plant B.

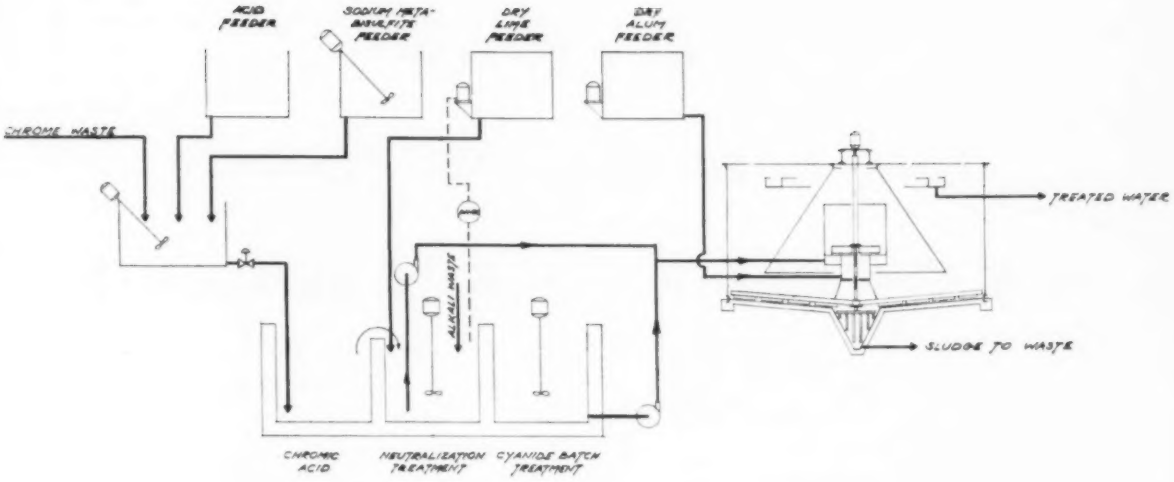

Fig. 5. Simplified flow diagram of waste treatment system for Plant C.

clarification equipment widely used in standard water treatment practice. While other methods have been used for clarification in waste treatment, this method has proved to be most effective. One of its main advantages in waste treatment is that it is so easy and practical to operate. There are several reasons for this:

1. In waste treatment, the *p*H in which clarification and coagulation take place is fixed since it must be high enough to precipitate metals but no so high as to redissolve them. This generally means a *p*H of about 8 or 9. Since it is normal to have a *p*H controller as the final control before treated water enters the clarification unit, there is no control problem and once the coagulant has been chosen and proper feed rate determined, the unit will run continuously without additional test work required and little operator attention.
2. Wastes are constant at an individual plating plant as opposed to water treatment installations where the contents of the water used may vary and adjustments must be made accordingly. Also, the consideration of impurities can vary considerably in water treatment, but waste variations can be anticipated and equipment provided to smooth out sudden loads.

CONCLUSION

Variations in plant design in the three case histories discussed in this article were all made with reference to a similar overall pattern which has been found to be very effective. All wastes were treated to remove or transform toxic contaminants so that all that was subsequently required was mixing, separation of precipitated metals and final treatment by simple clarification. Where it was justified, automatic equipment was included to reduce the operator burden and wherever possible, the amount of equipment required was reduced by utilizing parts of the waste treatment building or area for surge and treatment vessels. Gravity, and static head were also used to advantage to lower requirements for pumps and other accessory equipment.

Two of the case histories (plants A and C) were concerned with the same plating wastes. However, a comparison of plant design shows the different approaches that were used in certain respects. These different approaches were based on some of the determining factors discussed in this article. Plant B had fewer wastes than the other two and this of course resulted in a different design. The main feature of plant B is its simplicity.

Variations in the design of waste treatment systems are important because they can make possible benefits most desirable to the plants using them. These benefits can affect economy, time, labor requirements and equipment costs. For this reason, a waste treatment plant should be carefully planned. Plant personnel should make full use of the experience and know-how of the consulting engineer and equipment manufacturer. Given the facts and the variables, they can provide the type of system most desirable in each individual case.

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Mr. Dvorin joined Graver in 1950 as a member of the company's technical department and was subsequently named head of laboratory operations. For the greater part of his time with Graver he has been involved in process design, development work and field technical service.

Mr. Dvorin has written several papers on industrial water and waste treatment which have been published and/or presented before conferences and technical meetings. He is a member of the Metropolitan Water and Waste Society, New York.

ANALYSIS FOR ZINC, CADMIUM AND COPPER IN ELCTROPLATING WASTE EFFLUENTS

by FRED STEVENS* AND L. E. LANCY**

The American Electroplaters' Society Research Project No. 2 has proposed analytical methods for the heavy metals that are usually encountered in metal finishing wastes.[1, 2, 3] Based on the AES Research Project results, the Metal Finishing Industry Action Committee with the Ohio River Valley Water Sanitation Commission also published "Procedures For Analyzing Metal Finishing Wastes.[4, 5] The authors when reporting their work in this field wish to stress the fact that they consider the published work of the AES Research Project No. 2 and the proposed procedures excellent in every respect. The basic considerations for this work is the fact that besides regulatory agencies and large industrial plants also some smaller plating establishments might require procedures that maybe lack the ultimate in sensitivity and accuracy but provide the needed results in a simplified manner.

Practical experience indicates that the colorimeter or spectrophotometer does not provide a correct answer if the equipment is not in skilled hands and is not used as a routine procedure. In view of the widely accepted use of the complexometric titrations in the plating industry and the sensitivity of the organic dyes used for even trace quantities of the heavy metals in consideration, it is our belief that the simplified procedures that we have worked out will possibly serve a useful purpose. The only addition possibly needed to the usual equipment of a plating laboratory would be a micro-burette with 0.02 ml subdivisions.

TITRATION FOR ZINC AND CADMIUM

Discussion:

Direct complexometric titrations of zinc and cadmium are in common use for the respective electroplating solutions.[6, 7] In a waste sample a number of cations may be present but complexing with an addition of cyanide and the subsequent de-masking of the zinc and cadmium with formaldehyde make this titration method specific for zinc and cadmium. Ascorbic acid is added to complex ferric iron that otherwise would affect the endpoint.

The standard EDTA titration with Eriochrome Black-T as an indicator does not differentiate between zinc or cadmium. To find the specific value for zinc and cadmium present it is necessary to eliminate the cadmium from the sample and this can be accomplished by precipitation as the sulfide from a solution in which an excess of cyanide will not allow any zinc to precipitate. After the cadmium is removed the remaining zinc is titrated again with EDTA and the quantity of cadmium can be established from the results of the two titrations.

The proposed method is sensitive for zinc and cadmium at concentrations of 0.5–50 ppm. The usual heavy metals present in waste samples such as copper, iron, nickel will not interfere.

Containing ppm metal ions	Found ppm	
10 Cu, 10 Fe, 10 Ni, 2.2 Zn, 9.29 Cd.	1.96 Zn	9.78 Cd
5 Cu, 5 Fe, 5 Ni, 5 Zn, 5 Cd.	5.89 Zn	5.62 Cd
5.05 Zn, 18.6 Cd	5.46 Zn	16.4 Cd
1.09 Zn	1.05 Zn	
2.18 Zn	2.01 Zn	
3.27 Zn	3.27 Zn	

Reagents:

1. EDTA solution 0.01 M. Dissolve 3.772 g of disodium ethylenediaminetetraacetate dihydrate in one liter of distilled water.
2. EDTA solution 0.001 M. Dilute 0.01 M EDTA 10:1 with distilled water.
3. Sodium cyanide cp.
4. Buffer solution. Dissolve 13.5 g of ammonium chloride in some water, add 88 ml of conc. ammonium hydroxide and dilute to 250 ml.
5. Eriochrome Black T sodium chloride indicator. Mix 0.1 g Eriochrome Black T in a mortar with 40 g sodium chloride.
6. Sodium sulfide solution 150 g/l.
7. Sodium cyanide solution 10 g/l.
8. Formaldehyde 1:1.

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A Procedure:

1. Pipette 100 ml sample of the solution to be tested into a 250 ml erlenmeyer flask. Neutralize the sample if necessary.
2. Add a pinch of ascorbic acid and one gram of sodium cyanide to the sample.
3. Add 25 ml of buffer solution and a pinch of eriochrome indicator mixture.
4. Add EDTA solution from the burette until the solution turns to a blue color. The EDTA consumed is disregarded, it was used for the titration of water hardness, etc.
5. Add 5 ml formaldehyde and titrate immediately with EDTA solution to a blue end point.
6. Repeat Step 5 and continue titration in case the color reverted back to red.

B Procedure:

1. Pipette 100 ml sample into a 250 ml beaker.
2. Add a pinch of ascorbic acid and one gram of sodium cyanide.
3. Add about 2 ml sodium sulfide solution and heat to near boiling.
4. Filter through Whatman #42 paper, washing filter several times with 10 g/l sodium cyanide solution.
5. Acidify the filtrate with sulfuric acid and boil to expel sulfide.
6. Cool and proceed as in A above from step 2 after the neutralization.
7. When 0.001 M EDTA is used each ml consumed is equivalent to 0.6538 ppm zinc or 1.124 ppm cadmium. When the 0.01 M EDTA is used each ml consumed is equivalent to 6.538 ppm zinc or 11.24 ppm cadmium. Deducting the milliliters of titrant used in the B Procedure from the quantity consumed in the A Procedure provides the ml consumption expended for the titration of the cadmium.

Comments:

0.001 M EDTA should be used for concentrations less than 5 ppm. Step 4 serves the purpose of titrating the metals in the sample that are not complexed with the cyanide. The titration of a distilled water blank sample will allow compensation for possible contaminations in the water, reagents and the glassware.

SPOT TEST FOR COPPER

The indicator Pan (1-(2-pyridyl-azo)-2 naphthol) forms with copper ions a deep color dye which is used at great advantage for micro-titrations of copper.[8] This color complex is suggested to be used for the detection of copper in trace quantities.

As an extremely quick method to establish the presence or absence of copper in a waste sample or steam condensate, etc. a spot test is suggested which has some features allowing a quantitative estimation in the range of 0.1–5 ppm.

Reagents:

1. Buffer solution: 6 g sodium acetate, 30 ml glacial acetic acid and 78 ml distilled water.
2. Pan indicator: 0.05 g dissolved in 100 ml. Methyl Alcohol. C.P. Dilute this solution 100:1 with alcohol.
3. Sodium nitrite, 1 g/l.

Procedure:

1. Place three drops of the solution to be tested on a white spot plate. Place three drops of water in a cavity of the plate for a blank.
2. Add one drop of sodium nitrite solution to each spot.
3. Add one or two drops of buffer to each spot, (depending on *p*H of sample, 2 drops if the *p*H is very high or very low).
4. Add one drop of dilute Pan to the spot. A pink coloration denotes 0.1 ppm copper or more. The addition of more Pan will make the spot become more intense in color if the copper content is 2 ppm or more, but will not change if the copper content is near the limit of identification.

Remarks:

The copper-Pan dye complex is specific and no interference was noted even if using relatively high concentrations of the other possible cations, such as 10–15 ppm Zn, Cd, Ni, Fe, Hg, etc.

TITRATION FOR COPPER

Discussion:

An extraction of the copper complex formed with neo-cuproine provides fast and accurate means for the spectrophotometric determination of copper in the range of 0.02–0.5 ppm.[9, 10] The precision of the method proposed by Brown is very good in the range up to 0.5 ppm copper extracted from a 100 ml solution. In case of higher copper concentrations in the sample the copper concentration should be lowered by dilution to remain in the concentration range which follows the straight line of absorbence needed for the determination using the spectrophotometer. High concentrations of heavy metals usual in effluent samples such as Zn, Cd, Fe, Al, Ni, etc., also the usual anions will not interfere.

Ferrocyanide compounds and mercury salts on the other hand interfere. Instead of using the color method to establish the copper concentration the neo-cuproine complex extract is destroyed with nitric and sulfuric acids and the inorganic salts of copper can be titrated with EDTA using Pan as an indicator.[8, 11] The interference of the ferrocyanide compounds which are common in the plating waste effluent necessitate the removal of the ferrocyanide from the sample before extracting. Mercury salts are used for the elimination of ferrocyanide and the mercury is masked with potassium iodide for the complexometric titration.

COPPER EXTRACTION:

Reagents:

1. Neo-cuproine solution, 50 ml neo-cuproine in 100 ml ethylene dichloride or chloroform.
2. Buffer solution, 100 ml glacial acetic acid, 125 g sodium acetate and 12.5 g hydroxylamine hydrochloride in 250 ml of solution.
3. Salt solution, 10 g sodium chloride in 100 ml of solution.
4. Sulfuric acid, conc.
5. Nitric acid conc.
6. Ammonium hydroxide conc.
7. Mercuric chloride solution, 10 g/l.

Extraction Procedure A—Ferrocyanides present or suspected:

1. Pipette 100 ml sample of the solution to be tested into a 250 ml beaker.
2. Add one ml of mercuric chloride solution and place on a magnetic stirrer for two hours minimum.
3. Filter the solution through Whatman #42 filter paper. Wash several times with distilled water, collecting sample and washings in a clean 250 ml beaker.
4. Add 5 ml salt solution and 5 ml buffer solution to the filtrate and washings and place on the stirrer for one minute.
5. Add 20 ml of neo-cuproine solution and continue to stir for ten minutes.
6. Transfer the contents of the beaker to a clean Squibb separatory funnel and allow the organic layer to settle. Draw off this layer into a 250 ml erlenmeyer flask. Add 5 ml of the solvent used (ethylene dichloride or chloroform) to the separatory funnel and shake to collect any traces of copper-neo-cuproine in the water layer and on the side of the funnel. Run this layer into the flask with the sample.
7. Add 10 ml of mixed sulfuric-nitric acid (using 5 ml of each) to the extract in the flask and boil gently for at least one hour under a hood.
8. Cool the sample and add approximately 75 ml distilled water and a small piece of litmus paper.
9. Add conc. ammonium hydroxide until the litmus just changes.

Extraction Procedure B—No ferrocyanides in the sample.

Proceed as in Procedure A but omit steps 2 and 3.

Complexometric titration:

Reagents:

1. EDTA solution, 0.01 M Dissolve 3.722 grams of EDTA in one liter of distilled water.
2. Buffer solution, 6 grams sodium acetate, 30 ml glacial acetic acid and 78 ml water.
3. Pan indicator 0.05 g in 100 ml Methyl alcohol.
4. Standard copper solution 0.01 M. (Dissolve 2.5 g Cu $SO_4.5\ H_2O$ in one liter of water, standardize against the standard EDTA solution.)
5. Potassium Iodide solution, 50 g/l.

Procedure:

1. Use the neutralized extract from either of previous extraction procedures as the sample.
2. Add 10 ml buffer solution and approximately 10 drops of Pan indicator.
3. Add a measured excess of 0.01 M EDTA solution and heat. (Approximately 150–180 F.) In the event that the pink color was not discharged additional EDTA is needed.
4. Add 1 ml of Potassium Iodide solution.
5. Titrate the yellow solution hot to pink or red end point with the standard copper solution.
6. Calculation:

ml EDTA added—copper standard solution used x 6.354 = ppm copper. 0.05 ml of the copper standard are needed to develop the copper-Pan color, therefore deduct this amount from the copper standard used.

Example:

If 10 ml EDTA was added and 8 ml copper standard was used for the titration, the sample contained 13.026 ppm copper.

Comments:

In samples free of ferrocyanide and mercury compounds the colorimetric determination at 460 μ wave length is a fast and exact method. The reference of Brown[10] indicates an analytical error of less than 1 per cent. The extraction and complexometric titration as given is very simple for manipulation but will require about 30–40 minutes of the analyst's time. The described method is very accurate even with high concentrations of various metal ions and anions including ferrocyanide present. Obtained accuracy was within 5–10 per cent.

In case a qualitative estimation is sufficient the "Copper Spot Test" method can be used.

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W. Fred Stevens was born at Grove City, Pa. in 1927. He received his BS degree in 1950 at Grove City College, where he majored in chemical engineering. He is chief chemist at Lancy Laboratory, Zelienople, Pa., and is in charge of electroplating research development. Mr. Stevens is serving his second term as secretary of Pittsburgh Branch, AES, and is a member of the Electrochemical Society. He co-authored with Dr. Lancy a paper presented at the 1957 AES Convention in Montreal.

FIVE YEARS OF ION EXCHANGE

User's Report on Service Experience in Plating Department Chemical Waste Treatment

by SAMUEL ROTHSTEIN*

BACK IN 1951, when faced with setting up a new plating department in Syosset, Long Island, and then controlling plating department chemical waste to comply with local health authority requirements, it seemed as though we were faced with an almost insurmountable problem. Now, after five years of operation, it has been demonstrated at Fairchild Camera and Instrument Corporation that such control is not only feasible and practical, but that it can be made a matter of simple routine.

Fairchild Camera is engaged in the manufacture of aerial reconnaissance cameras and precision instruments. Because of the nature of the products and the variety of parts, the plating department is required to apply a wide assortment of finishes, such as:

Plating—Cadmium, chrome, copper, gold, nickel, black nickel, silver, tin and zinc.

Anodizing—Chromic and sulphuric (clear, black, green, red)

Surface Treatments—Phosphate, passivate, chemical film (aluminum alloys), dichromate (cadmium and zinc), dichromate (Dow no. 7, magnesium alloys)

Chemical Blacks—Steel, stainless steel, copper alloys.

During the five year period, the normal working hours for the plant varied from a 40 hour week (5 days, 8 hours per day) to a round-the-clock operation (7 days/week, 24 hours/day).

Fig. 1 illustrates the general layout of the plating department.

TOLERANCES FOR CHEMICAL WASTES

Local health authorities have set the following limits on plating department chemical wastes:

*p*H	6.5–8.5
Total alkalinity as $CaCO_3$	400 ppm max
Phenolphthalein alkalinity	15 ppm + 0.4 times total alkalinity max
Ammonia	2.0 ppm
Chromate	0.05 ppm
Copper	3.0 ppm
Zinc	15.0 ppm
Cadmium	0.3 ppm
Iron plus manganese	0.3 ppm
Cyanide	0.1 ppm
Sulfate	250 ppm

In order to meet these requirements, a threefold problem must be overcome. First and foremost, of course, is that of limiting chromate in the waste to 0.05 ppm. Second is that of decomposing the cyanide to the less toxic cyanate (or completely to carbon dioxide and nitrogen) and third is that of neutralizing the waste so that the *p*H falls within the prescribed limits.

PROCESSES USING CHROMIC ACID OR CHROMATES

The chromate-containing metal finishing facilities consist of the following:

1. Chromic Acid Anodizing (approx. 10 per cent CrO_3)—700-gal capacity, followed by a cold water rinse tank and a hot water rinse tank.
2. Dichromate on magnesium (Dow no. 7) (approx. 15 per cent $Na_2Cr_2O_7$)—360-gal capacity, followed by a cold water rinse tank and a hot water rinse tank.
3. Chrome Pickle (approx. 15 per cent CrO_3)—200-gal capacity, followed by a cold water rinse tank.
4. Chromate Conversion Coating (approx. 15 per cent $Na_2Cr_2O_7$)—125-gal capacity, followed by a cold water rinse tank.
5. Chromate Film on Aluminum Alloys (approx. 1.0 per cent CrO_3)—200-gal capacity followed by a cold water rinse tank.
6. Chrome Plating (production work) (approx. 25 per cent CrO_3)—200-gal capacity followed by a dragout rinse tank, a cold water rinse tank and a hot water rinse tank.
7. Chrome Plating (tool work) (approx. 25 per cent CrO_3)—140-gal capacity followed by a cold water rinse tank.
8. Chromic Acid Bright Dip (approx. 15 per cent CrO_3)—45-gal capacity (for bright dipping close dimensioned copper alloy parts).
9. Copper Strip (approx. 15 per cent CrO_3)—30-gal capacity (for stripping excess copper from copper brazed steel assemblies). (Note: no. 8 and no. 9 utilize same cold water rinse as no. 7.)

The above adds up to nine primary processing tank containing chromate (a total of 2000 gal of an average of 15 per cent concentration), seven cold water rinse tanks and three hot water rinse tanks.

Since the limit on chromates was so low (0.05 ppm), it was apparent that waters containing chromate would have to be segregated for special treatment. However, just at this time, the new development of an ion exchange resin† was announced which was capable of removing chromates from solutions resulting from metal finishing processes. This would make it possible to install an entirely "closed" treatment system, containing all toxic chromic acid solutions within the metal treating facilities, and thereby eliminating the need of a batch type treatment plant for reduction and precipitation

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† Developed by The Permutit Company, Division of Pfaudler Permutit Inc., New York, N. Y.

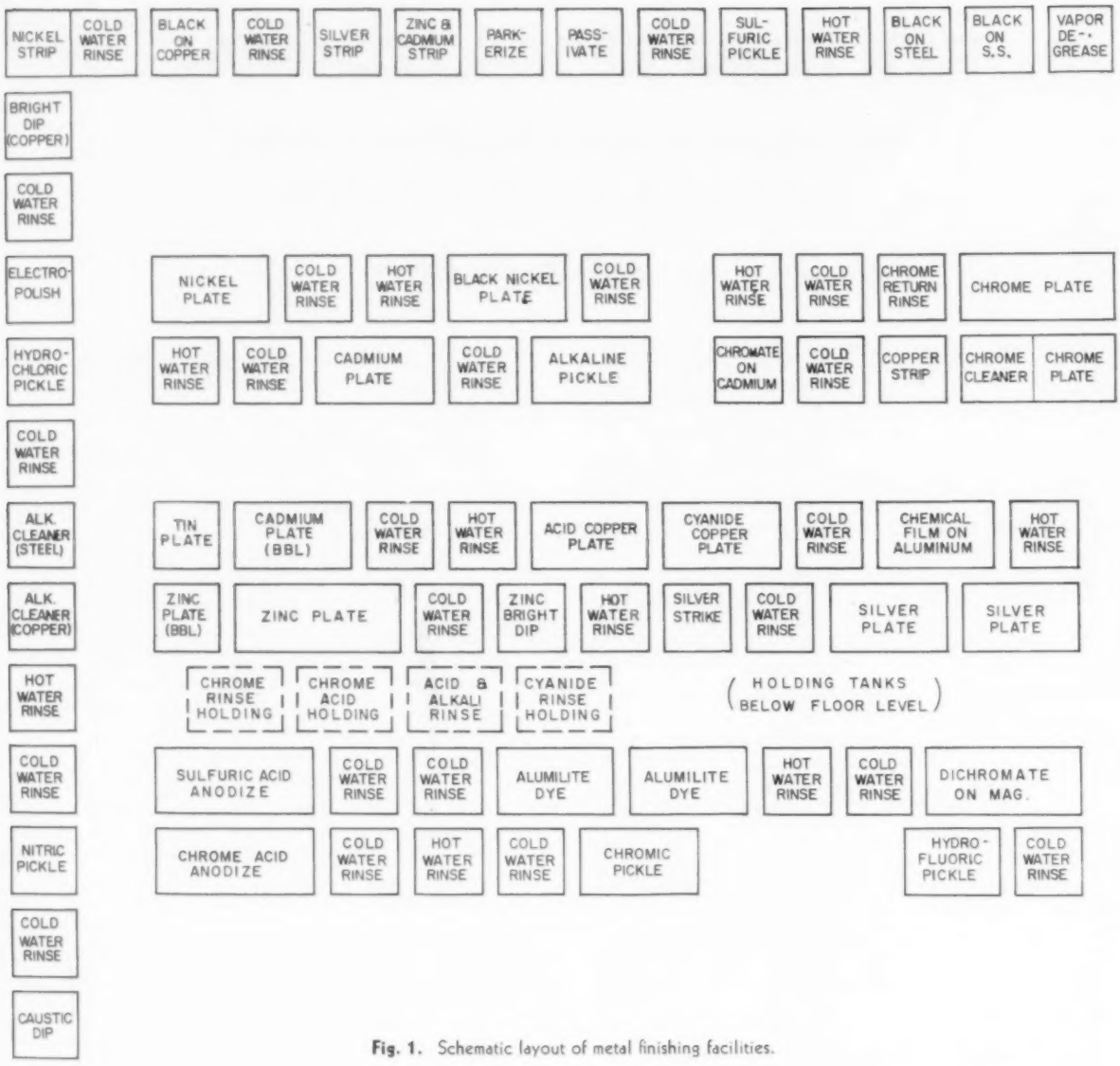


Fig. 1. Schematic layout of metal finishing facilities.

of chromates. Furthermore, it would make it possible to recover the chromic acid for re-use in the plating department.

ION EXCHANGER EQUIPMENT

After a series of meetings of representatives of the firm, the equipment manufacturer and the building engineers, ion-exchange was decided upon, and the following equipment was planned and subsequently installed:

1. Q-H unit,* consisting of a straight side steel shell, 24 in. diameter by 7 ft long, saran rubber lined, filled with 10 cu ft Q* resin.
2. Three S units,* each consisting of a straight side steel shell, 24 in. diameter by 7 ft long, saran rubber lined, filled with 8 cu ft S* resin.

* Q and S units and resins, manufactured by The Permutit Company, New York, N. Y.

Regeneration equipment, automatic controls and other necessary operating accessories for the proper functioning of the ion-exchange equipment.

The layout of this equipment is schematically illustrated in Figs. 2 and 3.

CHROME REMOVAL BY ION EXCHANGER PROCESS

The overflow from the various cold water rinse tanks in the chromate system is piped to a common holding tank located below the plating department. From here it is pumped through a metering valve into the cation-exchanger (Q unit), and then into two anion-exchangers (S units). The effluent is combined, flowed over a Solu-bridge conductivity cell, and is then piped to the several rinse tanks. These tanks are fed at the rate of approximately 5 gpm, making a total flow of

approximately 35 gpm. The hot water rinse tanks are emptied periodically, as the need arises, into the same system, and are refilled with the ion-exchange effluent.

To make up for water lost by evaporation and drag-out, fresh water (from the company's own wells) is added periodically. This fresh water is fed through a third S unit primarily to remove chlorides and sulfates, so as not to load the chrome recovery system with these ions unnecessarily, and thereby limiting the capacity for chromate ions.

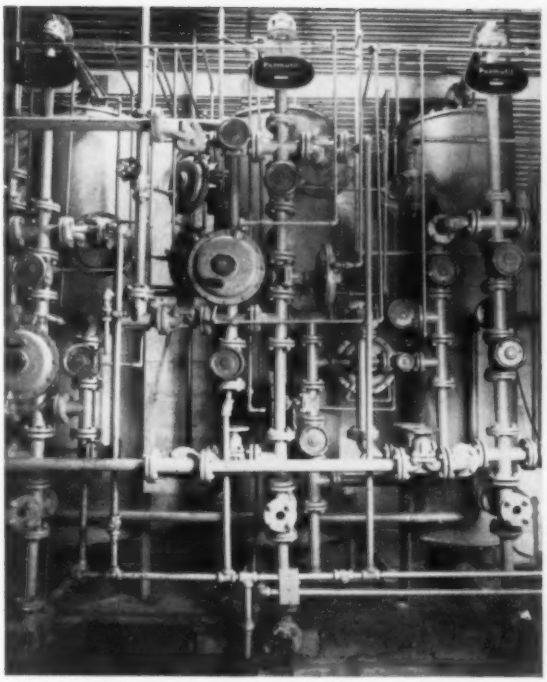
As a result of this recycling through the ion-exchange equipment, chromates are constantly being removed from the rinse water, and water of demineralized quality is being made available for rinsing of parts.

S ion-exchange resin is rated at the removal of 2 lb chromic acid as CrO_3 per cu ft. Consequently, the two S units, containing 8 cu ft of S resin per unit, are rated at 32 lb of chromic acid. In practice, with an average work load, it has been found necessary to regenerate these units at 10 week intervals. To equalize work load, and to insure continuous purity of effluent, it has been found expedient to stagger these regenerations, so that alternate units are regenerated every 5 weeks. The need for regeneration is determined by the purity of the effluent as indicated by the Solu-bridge. Immediately after regeneration, the effluent runs as low as 1–2 ppm of contained electrolytes; as the S unit approaches exhaustion, slippage of chrome increases and the purity of the effluent decreases at an increasing rate. While it may take a week to go from 1–2 ppm to 5 ppm, it takes only days to go from 100 ppm to 200 ppm. Consequently, once the 100 range is reached, regeneration is considered necessary and is scheduled as early as possible.

ANION EXCHANGER REGENERATION

Regeneration of an S unit is accomplished as follows:

1. The Q unit is flushed out with water to the rinse holding tank, which has been preliminarily set up for this operation by not making up evaporation and drag-out losses, and is essentially empty.
2. The Q unit is regenerated in the normal manner.
3. The S unit to be regenerated is flushed out with fresh water to the rinse holding tank.



Front view of ion exchange equipment showing piping arrangement and automatic valves.

4. The S unit is regenerated with sodium hydroxide solution and the effluent of the S unit is diverted through the Q unit to the chromic acid pickling tank. The chromic acid pickling tank has previously been set up to receive the S regenerant effluent by evaporation down to approximately a 50 gal level, leaving approximately 150 gal available to receive the S regenerant.
5. Slow rinse of the regenerant from the S unit is also diverted through the Q unit to the chromic acid pickling tank.
6. When the chromic acid pickling tank has been filled, the regenerant effluent from the S and Q unit, in series, is diverted to an overhead storage tank which has a

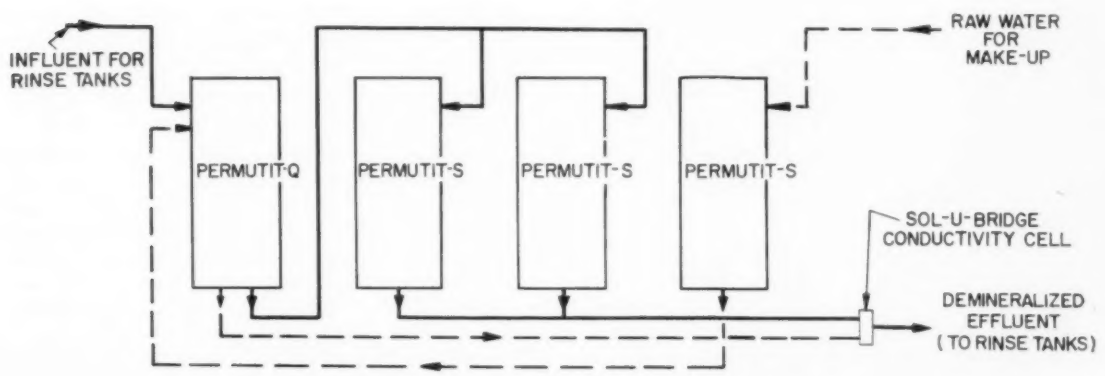


Fig. 2. Schematic of ion exchange equipment.

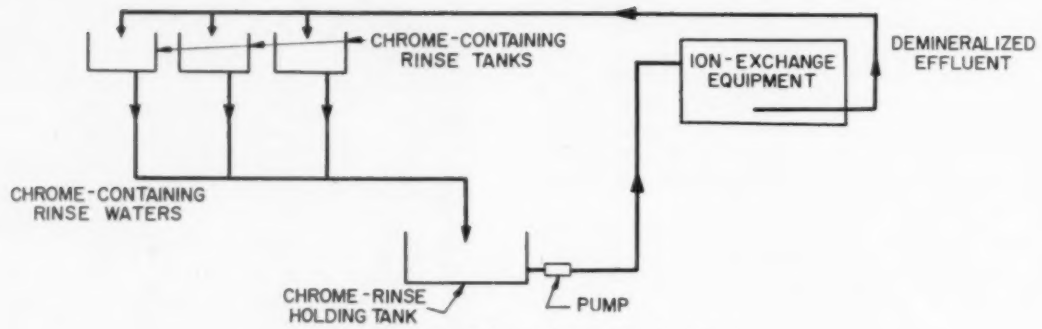


Fig. 3. Schematic of chrome-rinse purification system.

holding capacity of approximately 200 gal. Thus a total of 350 gal of S regenerant and rinse water volume are received into various tanks in the plant. At the completion of this rinsing operation it is found that the chrome content of the rinse effluent of the S unit is approximately 16 ppm concentration of CrO_3 and the *p*H of the S unit effluent is approximately 10.5.

7. The unit is then returned to rinse water service.
8. The Q unit is again regenerated in its normal manner since it has been exhausted by the removal of the sodium from the caustic regenerant employed in regenerating the S unit.

Regeneration of the Q unit is accomplished as follows:

1. The Q unit is flushed out with water to the rinse holding tank until chromates have dropped below 0.05 ppm. (The rinse holding tank has been preliminarily set up for this by not making up evaporation and drag-out losses)
2. The Q unit is regenerated with sulfuric acid solution.
3. Since no chromates are contained in the regenerant effluent, the effluent is discharged to the regular acid and alkali waste treatment system.
4. The unit is then returned to service.

Since automatic equipment was provided, the only manual labor involved in these regenerations is making-up the regenerant solutions, flushing the units with water, and, in step 6 above, diverting the effluent to the overhead tank when the pickling tank is filled.

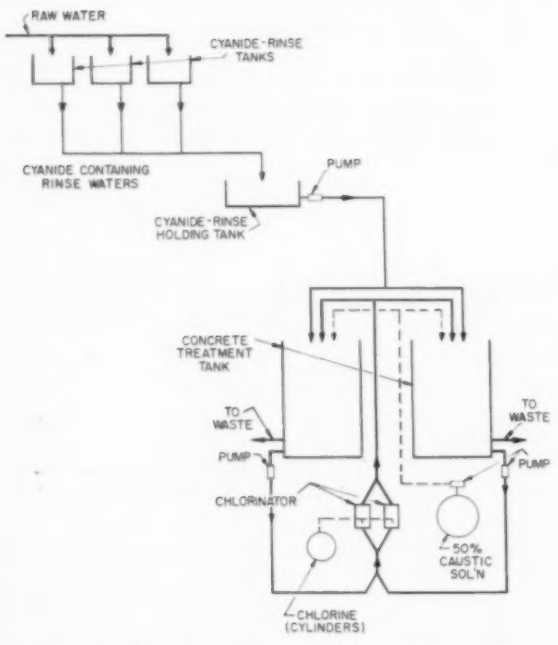


Fig. 4. Schematic of waste cyanide treatment system.

PURIFICATION OF CHROMIC ACID SOLUTIONS

In addition to the removal of chrome from the rinse waters, the ion-exchange equipment is used to purify the chromic acid anodizing solution, eliminating the necessity of dumping CrO_3 periodically.

Conventional practice in operating a chromic acid anodizing bath is to make up the bath at 5 per cent. As the bath is used, *p*H rises because of the neutralization of the free chromic acid by the aluminum going into solution. Chromic acid up to 10 per cent is added to keep the *p*H below 0.85. When the concentration of chromic acid reaches 10 per cent and the *p*H rises above 0.85, some anodizing solution is drawn off and discarded, and fresh chromic acid is added, if necessary, to obtain a minimum of 5 per cent concentration, and a *p*H of less than 0.85 again. This cycle is repeated continuously.

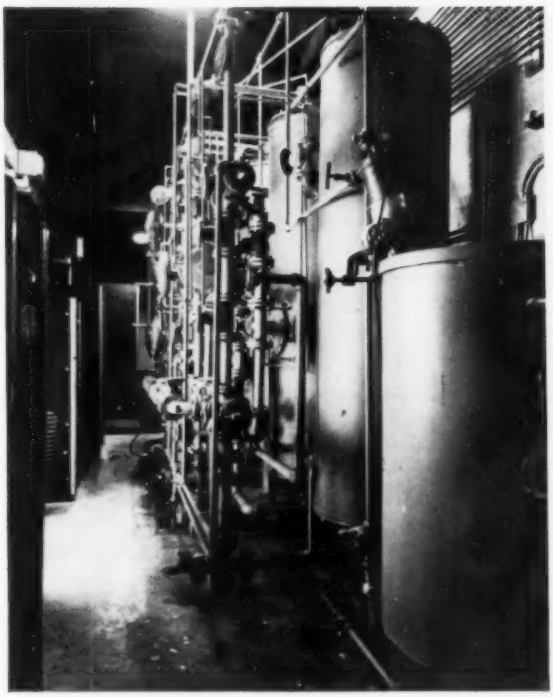
With the ion exchange equipment available, the anodizing bath was made up immediately to a 10 per cent concentration of chromic acid. Concentration limits were set as follows:

CrO_3 8–10 per cent	NaCl <0.2
R_2O_3 <4.0 g/l	H_2SO_4 <0.5
*p*H <1.0	

The bath is controlled by the build-up of mixed metallic oxides, rather than by change in *p*H. In operation, a build-up of approximately 0.5 g/l R_2O_3 occurs per month. Although the limit is set at 4.0 g/l, the bath is operated at 1–2 g/l. When 2 g/l concentration is reached, approximately half the tank (350 gal) is processed through the Q cation-exchange unit. This requires two Q regenerations, and yields a bath containing overall 1 g/l R_2O_3 again.

The mechanics of treating the anodizing solution in the Q cation-exchange unit is as follows:

1. Makeup water for evaporation losses is not added to the anodizing tank prior to the treatment of the ano-



Righthand view of ion exchange equipment showing regenerant tank in right foreground and rectifiers on left.

dizing solution in the cation-exchange unit: thus the volume of the anodizing tank is down by approximately 50 to 100 gal.

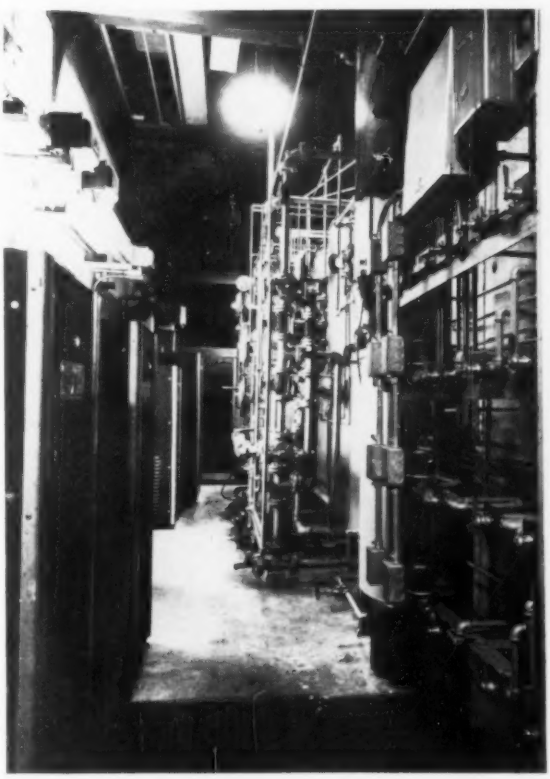
2. The liquid volume in the chrome pickle tank is boiled down to approximately 50 gal in a 200 gal tank.
3. The Q unit is regenerated in the normal manner.
4. The liquid in the Q unit is drained completely, its contents being drained to waste.
5. The anodizing solution from the anodizing tank is dropped from the anodizing tank down to the strong chromic acid holding tank.
6. The anodizing solution to be processed is then pumped from the holding tank through the Q unit to the anodizing tank until the holding tank is empty.
7. The Q unit is drained as completely as possible of anodizing solution to the anodizing tank.
8. Sweetening-off water is then added to the Q unit, and the Q unit is rinsed to the anodizing tank until the maximum liquid level which can be held in the anodizing tank is obtained; this is 50 to 75 gal above the normal liquid level. Thus, with approximately 50 to 100 gal of drawdown in the anodizing tank prior to processing of the solution, a total of 150 gal of sweetening-off water is diverted to the anodizing tank. After this additional 150 gal of sweetening-off water has been passed through the Q unit to the anodizing tank, the concentration of chromic acid to the effluent of the Q unit is approximately 30 to 40 ppm CrO_3.
9. After the completion of step 8, sweetening-off water is continued to be passed through the Q unit, and directed to the chromic acid pickle tank. This results in an additional 150 gal of sweetening-off, or total sweetening-off water volume of 300 gal.
10. After step 9, the chrome content in the effluent of the Q unit is found to be low enough to allow regeneration of the Q unit without fear of sending excess chromic acid to the sewer.
11. After regeneration, in step 10, the Q unit is returned to flowing rinse water recycle operation.

SAVINGS EFFECTED BY ION EXCHANGER PROCESSES

Insofar as the economics of the system are concerned, we estimate that over the past five years, the ion exchange system has enabled us not only to prevent the discharge of chrome-containing waste out of the plating department, but to do so at a saving of over $8000 as well.

The savings accrued as a result of our practice of purifying the chromic acid anodizing solution can be calculated readily. Each treatment consisted of half the tank. The 350 gal anodizing solution at 10 per cent concentration contains 280 lb chromic acid. At the current market price of 31 cents per lb, this is $86 worth of chromic acid which is recovered instead of being lost in batch dumping, as is the usual practice. In the course of this recovery, 2 Q unit regenerations are required, utilizing a total of 200 lb sulfuric acid. At the current price of 3 cents per lb, this is a total chemical cost of $6. Thus, the net recovery is $80 per purification.

These savings are further enhanced when the cost of batch



Righthand view of ion exchange equipment showing automatic control rack containing solenoid valves, 4-way air valves and Flexo-timers for cycle control of automatic regeneration in the righthand segment of the photograph.

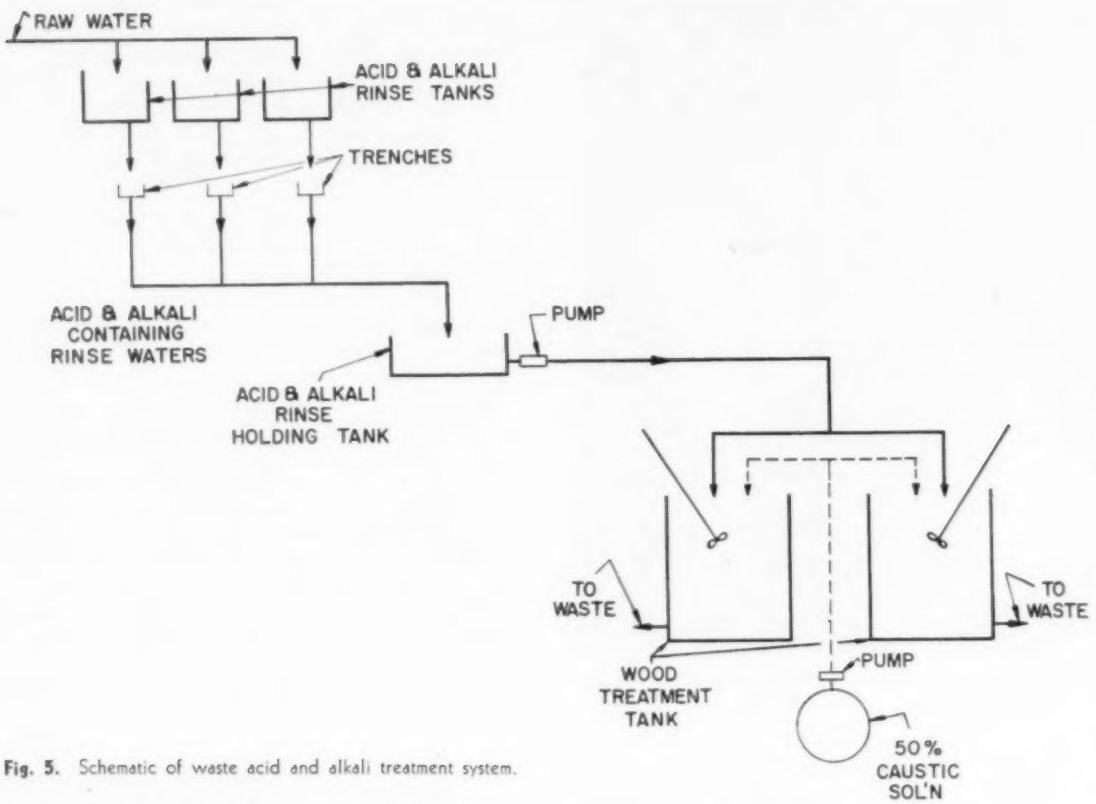


Fig. 5. Schematic of waste acid and alkali treatment system.

reduction and precipitation of the 350 gal chromic acid solution is considered. Using copperas ($FeSO_4 \cdot 7H_2O$) to reduce the chrome to trivalent chrome according to the reaction $H_2Cr_2O_7 + 6\,FeSO_4 + 6\,H_2SO_4 \rightarrow Cr_2(SO_4)_3 + 3\,Fe_2(SO_4)_3 + 7\,H_2O$ and following this with lime slurry to neutralize the acid and precipitate the metal salt according to the reactions

$$Cr_2(SO_4)_3 + 3\,Ca(OH)_2 \rightarrow 2\,Cr(OH)_3 + 3\,CaSO_4$$
$$Fe_2(SO_4)_3 + 3\,Ca(OH)_2 \rightarrow 2\,Fe(OH)_3 + 3\,CaSO_4$$

for each pound of chrome, we would require 16 lb copperas, 6 lb sulfuric acid and 9.5 lb lime. The 350 gal of 10 per cent chromic acid would therefore require 2400 lb copperas, 900 lb sulfuric acid, and 1425 lb lime. At current prices of 5 cents, 3 cents and 3 cents per lb, respectively, this would cost $190.

Similarly, in the treatment of chrome-containing rinse water, the following savings and costs can be calculated. Assuming, conservatively, that the S unit is regenerated when it is only half saturated with chrome, 8 lb chromic acid is recovered per regeneration. At the current price of 31 cents per lb, this is $2.48 worth of chromic acid. A complete regeneration involves two Q unit regenerations and the one S unit regeneration. This requires 200 lb sulfuric acid and 36 lb caustic soda. At the current prices of 3 cents and 6 cents per lb, respectively, this is a total chemical cost of $8.16. Thus, the net cost is $5.68 per regeneration.

The batch reduction and precipitation of the 8 lb chromic acid in the 2000 or so gal of rinse waters would require 133 lb copperas, 50 lb sulfuric acid, and 79 lb lime; this would cost $10.52 in all.

Summarizing then, the savings effected over the five year period are as follows:

1. Purification of Chromic Acid Anodizing Solution:		
Direct savings per treatment (recovered CrO_3)	$86	
Chemical cost per treatment	−6	
Net direct savings per treatment	$80	
Number of purifications in 5-yr period	×30	
Total direct savings		$2400
Indirect savings per treatment (cost of reduction and precipitation)	$190	
Number of purifications in 5 yr period	×30	
Total indirect savings		$5700
Total savings		$8100
2. Purification of Chrome-containing Rinse Water:		
Direct savings per treatment (recovered CrO_3)	$2.48	
Chemical Cost per treatment	8.16	
Net cost per treatment	5.68	
Number of purifications in 5-yr period	×50	
Total direct cost		$284

Indirect savings per treatment (cost of reduction and precipitation)	$10.52
Number of purifications in 5 yr period	×50
Total indirect savings	$526
Total Savings	$242
Savings, Grand Total	$8342

PROCESSES USING CYANIDES

The cyanide-containing metal finishing facilities consist of the following:

1. Cadmium Plating, still (approx. 15 per cent CN)—360-gal capacity, followed by a cold water rinse tank and a hot water rinse tank.
2. Cadmium Plating, barrel (approx. 15 per cent CN)—160-gal capacity, followed by a cold water rinse tank and a hot water rinse tank.
3. Copper Plating (2 per cent CN)—200-gal capacity. (Uses same rinse as barrel cadmium.)
4. Silver Plating (approx. 10 per cent CN)—two tanks of 250-gal capacity each, followed by a cold water rinse tank.
5. Zinc Plating (approx. 15 per cent CN)—360-gal capacity, followed by a cold water rinse tank.

The above adds up to 6 primary processing tanks containing Cyanide (a total of 1580 gal of an average of 12 per cent concentration), four cold water rinse tanks and two hot water rinse tanks.

CHLORINATION OF CYANIDE WASTES

Two chlorination units* were installed. Lay-out of this equipment is schematically illustrated in Fig. 4.

The overflow from the several cold and hot water rinse tanks in the cyanide system is piped to a common holding tank located below the plating department. From here it is pumped to one of two 8500-gal capacity concrete holding tanks located in a waste treatment room. This overflow normally contains 2–5 ppm CN. When the first tank is full, the overflow is fed to the second tank while the first is being treated. A solution of 50 per cent caustic soda is introduced into the treatment tank until the *p*H is raised to 9.5 + 1.0. Chlorine is then added through the chlorinator until a check with O-toluidine shows some residual chlorine, thereby indicating complete destruction of the cyanide. This is then dumped.

ACID AND ALKALI WASTES AND TREATMENT

The major acid and alkali-containing metal finishing facilities consist of the following:

1. Acid Copper Plating (approx. 7 per cent H_2SO_4)—200-gal capacity, followed by a hot water rinse tank.
2. Nickel Plating (*p*H 3.5)—360-gal capacity, followed by a cold water rinse and a hot water rinse.
3. Passivating Solution (approx. 15 per cent HNO_3)—125-gal capacity, followed by a cold water rinse.
4. Sulfuric Acid Anodizing (approx. 15 per cent H_2SO_4)—700-gal capacity, followed by a cold water rinse tank and a hot water seal rinse tank.
5. Tin Plating (approx. 1 per cent NaOH)—120-gal capacity.
6. Caustic Dip (approx. 5 per cent NaOH)—200-gal capacity, followed by cold water rinse.
7. Alkaline Electro-cleaner (approx. 5 per cent NaOH)—three 200-gal capacity tanks, followed by a cold water rinse tank.
8. Chemical Black (approx. 15 per cent NaOH)—two 15-gal capacity tanks, followed by a hot water rinse tank.
9. Hydrochloric Acid Pickle (approx. 25 per cent HCl)—160-gal capacity.
10. Hydrofluoric Acid Pickle (approx. 10 per cent HF)—125-gal capacity, followed by a cold water rinse.
11. Nitric Acid Pickle (approx. 50 per cent HNO_3)—50-gal capacity, followed by a cold water rinse.
12. Nitric-Sulfuric Bright Dip (approx. 80 per cent H_2SO_4 and 20 per cent HNO_3)—50-gal capacity, followed by a cold water rinse tank.
13. Sulfuric Acid Pickle (approx. 50 per cent H_2SO_4)—120-gal capacity, followed by a cold water rinse tank.

The above adds up to 13 primary processing tanks containing acids or alkalies, nine cold water rinse tanks and four hot water rinse tanks.

Simple neutralization equipment was decided upon and installed. The layout of this equipment is schematically illustrated in Fig. 5.

The overflow from the several cold and hot water rinse tanks runs into the trenches in which the tanks are located and is then piped to a common holding tank located below the plating department. From here it is pumped to one of two 3500-gal capacity wood tanks located in the waste treatment room. This overflow is normally at a *p*H of 4 t 6. When the first tank is full, the overflow is fed to the second tank while the first is being treated. A solution of 50 per cent caustic soda is introduced into the treatment tank until the *p*H is raised to 8.0. The liquid is then dumped.

Since these acid-containing waters are collected from the several trenches, they may, on occasion, pick up some cyanide due to excess drag-out or spillage. When this happens, the rinses are piped into the cyanide treatment tanks and treated like cyanide-containing wastes.

* Wallace and Tiernan, Belleville, N. J.

Samuel Rothstein was born in New York City in 1917. He graduated from the College of the City of New York in 1940 with the degree of BS in chemistry and metallurgy. After teaching in the U.S. Air Force Technical Schools during the war, he started with the Fairchild Camera and Instrument Corp. in 1944 as metallurgist, and subsequently held the positions of general foreman of the finishing department, and then staff consultant on materials and finishes. He is now associated with another Fairchild enterprise—Fairchild Graphic Equipment Corp.—where he is working on the improvement of materials and finishes. He is a member of AES, ASM, and ASTM.

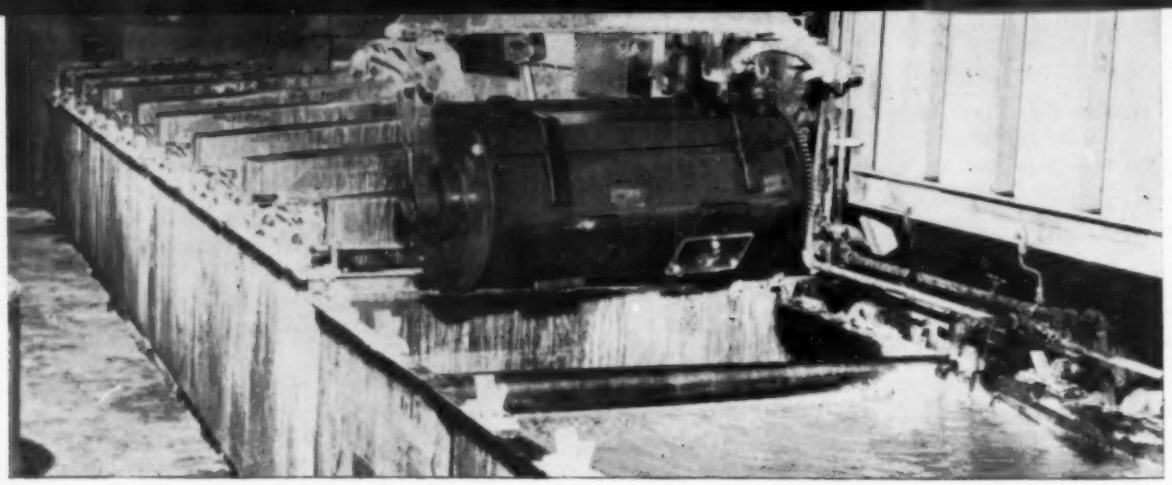


Fig. 1.

THE CONSERVATION APPROACH TO INDUSTRIAL WASTE CONTROL*

by DAVID MILNE†

WHEN THE NEED FOR SOME ACTION to take care of the liquid wastes derived from manufacturing processes became evident in this country, the first approach was to handle each objectionable waste at its source and to see what had to be done about removing the liquid from that source and treating it separately to make it acceptable. At that time, very little thought was given to recovery of the material and simple destructive processes were used. Examples of this approach can readily be quoted or found by review of the early literature on the subject. In most cases, the treatment process consisted of placing the troublesome liquid in a separate vat or tank, adding a chemical or chemicals which would destroy the objectionable material, and then discharging the presumably pure liquid to the sewer or water course.

Following this initial approach to the problem, and realizing that just as much trouble could be experienced from the large volumes of much less concentrated wastes which were being discharged from rinses and similar activities, it became the practice to accumulate all of the liquid wastes being discharged from a plant and treat them all together. In this approach, the industrial waste engineer simply determined what volume of liquid was being discharged from the plant and what concentration of each component was present in the total plant effluent. His waste treatment plant was then designed to handle all of these wastes in their highly diluted form. This approach naturally led to some high costs for treatment facilities, and made it necessary for waste control engineers to review carefully what could be done toward saving on the size of these plants.

This brought about the concept of the segregation of the more harmful and highly concentrated wastes, treatment of these highly concentrated wastes at their point of use, and discharge into the process liquid sewer system for combination with other wastes treated at a central treatment plant. This was not satisfactory as a solution to the problem due to the necessity for maintaining several isolated treatment areas within the manufacturing plant. One reason for the failure of this method was in the fact that humans being only human, the isolated treatment areas were not given the attention they should have had for proper control of the process, and treatment of many wastes was neglected.

The next logical step was to transport these segregated wastes to the central treatment location and to treat them separately at this location. This had the advantage of bringing all wastes together at one point where complete supervision and responsibility could be assigned.

A growing concern for the high cost of waste treatment caused many engineers to review quite carefully what could be done to reduce, not only the volume of wastes being discharged, but the concentration of the different materials. This led to the present emphasis on conservation methods as one of the early steps in a waste control program.

As an example of the recognition of the need for control measures rather than destructive treatment, the General Motors Industrial Waste Treatment Committee changed its name to the Industrial Waste *Control* Committee in 1946. This committee, which was formed in 1945 to investigate methods of waste treatment and to advise the Divisions on the proper approach to the problem, recognized early in its existence that *control* rather than treatment had to be the key to satisfactory handling of waste problems.

The first thing to be done in attacking an industrial waste problem is to carry out a complete plant survey of the wastes. This survey should preferably be made by an outside organization experienced in such work, and with the complete cooperation of plant processing people who know the details of the operations. Assigning plant personnel to conduct the survey is rarely successful unless they can spend full time on the job undistracted by other responsibilities and if they have enough experience and understanding of the problems involved.

This survey determines over a reasonable period of time the volumes and concentrations of each of the wastes dis-

*Presented at the Industrial Waste Conference, Kansas City, Missouri, July 10 1957.

†Supervisor, Materials and Processes, Production Engineering Section, Process Development Staff, General Motors Corporation, Detroit, Michigan.

charged from all of the manufacturing processes in the plant. With this survey as a basis for operation, the waste control engineer can then review each process to determine how its wastes can be reduced either in volume or in concentration. When this has been done, and the necessary steps taken, the next move is consideration of methods for recovering the more valuable constituents of that waste.

In some cases, it has been found that substitution of a different type of process has solved the problem, making it unnecessary to discharge any liquid wastes whatsoever.

It is quite obvious that waste prevention and recovery represent two of the most important areas in the waste control program for saving money for the plant. Chemicals which are recovered for further use do not require the spending of money for treatment materials or treatment facilities. In addition, there is no necessity for buying more chemicals to replace those lost down the sewer.

The latest concept of the field is that industrial waste control is only one portion of the much broader field of water management. Water management requires that the engineer recognize the importance of water to the manufacturing plant from the time the site for the plant is chosen to the time the last gallon goes down the sewer. The availability of sufficient and suitable water supply should be a factor in selection of plant location. Once water is piped to the plant, then it becomes the engineer's responsibility to see that it is used in the most economical manner possible. His management of water usage in the plant should make sure that there is no unnecessary waste and that water used for purposes which do not contaminate it can be reused time and again before final disposal. The fact that the water becomes contaminated with chemicals during its progress through the plant is only one of many considerations in the over-all area of water management.

The main purpose of this paper is not to discuss the general aspects of water management but to set forth specific things which can be done by manufacturing plants to cut down the volume of waste materials leaving their plants and to conserve the sometimes valuable chemicals being lost in waste waters.

Here are ten general steps which may be taken to cut down wastes.

Step No. 1: Establish better engineered methods for rinsing plated parts. While many plants still follow the practice, the old method of using separate free-flowing rinses in each of two or three baths following a plating tank is rapidly going out of the picture. There just isn't enough water available for such wasteful practices and, in addition, a tremendous amount of valuable chemicals is lost down the sewer by this method.

Use still dip tanks (which can be used as makeup to plating solutions), fog rinses, air jets to blow concentrated solutions off the parts back into the main tank; use drip racks which will set solution dripping from the parts or from plating barrels run back into the plating solution; use counter current controlled flow rinsing, or any other device which will allow you to save as much solution as possible.

One technique at use in several of our plants, especially on barrel platers, is to allow the work to come to rest above the plating tank before passing on to the first rinse tank. This allows as much solution as possible to drain from the work back into the plating solution before it passes on to the rinse (Fig. 1). The rinse in this case is usually a "still" or "reclaim" rinse which can be fed back into the plating solution (Fig. 2). This works particularly well where the plating solution runs at higher temperatures and has considerable evaporation from the surface.

Another technique is the use of fog sprays (Fig. 3). These sprays are timed to operate only when a rack is rising in front of them (Fig. 4). The rinse dripping from the racks falls back directly into the plating bath. In one case the following of these practices cut down the loss of cyanide plating solution by 86 per cent and it is expected that this recovery will increase to 97 per cent by adding one more recovery stage.

Don't overlook the possibility of using a less concentrated solution. In some chrome plating operations it has been found possible to lower the concentration of solution from 32 oz/gal to 10 oz/gal. This results in less chemical lost by drag-out on the parts being plated.

Step No. 2: Check the possibility of substituting a chemical process which will not result in an objectionable waste. There is an instance where the manufacture of a certain part required that the part be forged, then pickled in acid, and drawn in a heat treat furnace. Use of the pickling solution resulted in the usual problem of disposal.

A careful review of the chemistry of the operation and the metallurgical requirements of the part resulted in substitution of a molten salt bath cleaning process which operated at a temperature suitable for producing the metallurgical proper-

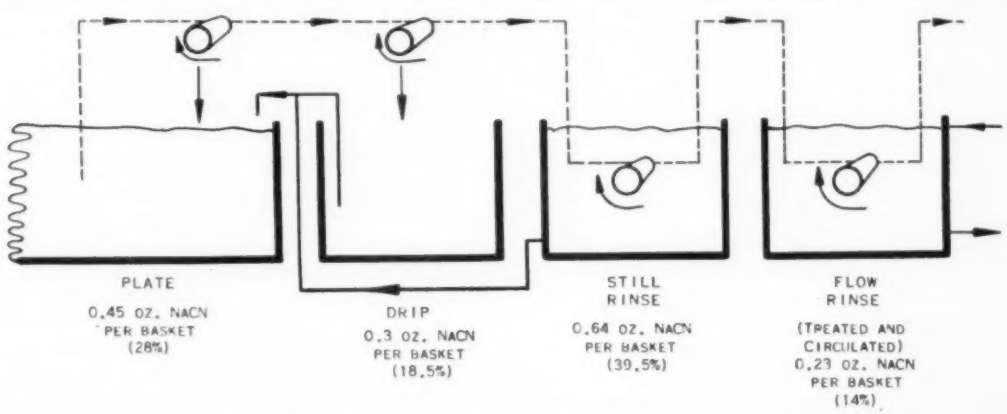


Fig. 2. Recovery of zinc plating solution. Example of savingspossible by use of two drain systems and a recovery rinse no zinc plating system. These are figures obtained by material balance at an operating installation.

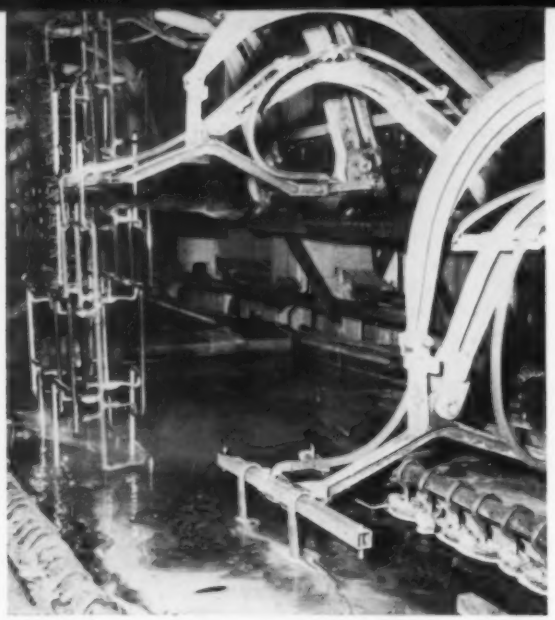


Fig. 3. Fog spray rinse being applied to plating rack emerging from concentrated plating solution.

ties in the part. As a bonus for substitution of this process, it was found that floor space requirements were cut down considerably, equipment maintenance was cut down and labor requirements were cut in half for the operation.

Other substitutions which have been made in General Motors plants include the replacement of copper cyanide solutions with acid copper in plating processes, replacement of molten cyanide heat treating baths with carbonitriding furnaces using a suitable gas atmosphere, replacement of acid pickling with alkaline derusting solutions and elimination of the use of chromated cleaners. These cleaners contained chromates as a means of preventing rusting after cleaning. Suitable substitutes were found for this type of cleaner.

Step No. 3: Try to find a mechanical process to take the place of a chemical process which produces an objectionable waste. Several plants have substituted abrasive cleaning for acid pickling to remove scale from forged parts. Abrasive cleaning is being applied to other parts as the economy and practicability are developed. The abrasive cleaning process produces no liquid wastes and removes the necessity for treatment of waste acid.

Step No. 4: Check the possibility of reconditioning or purifying solutions on a regular basis so that the life of the solution may be extended. In certain plating plants extensive use of electro-purification is practiced, and also recovery methods for removing metals such as copper from plating solutions.

Many GM plants make use of the acid-copper plating bath. During operation of this bath, the concentration of copper increases considerably. In order to maintain solution strength at the proper level, quantities of acid-copper plating solution are withdrawn from the operating bath at regular intervals and treated in a copper recovery plating tank. In this bath, used copper anode "swords" which are no longer fit for use in the plating bath, are set up as cathodes and the excess copper in the solution plated on to these cathodes. These are then reused in the copper plating bath to replace anodes which would have to be otherwise purchased.

Electro-purification is a standard practice particularly in the nickel baths to remove metallic impurities.

Sometimes the purification process itself results in loss of valuable chemicals. This is particularly so where activated carbon treatment is given a plating solution in an open tank. Reuse of these treated solutions after the activated carbon treatment always resulted in loss of a certain volume of concentrated solution remaining at the bottom of the treatment tank. Many of our plants have substituted activated carbon packs in conventional filter equipment to stop this waste.

Reconditioning of solutions has paid off in the area of "soluble" cutting fluids. Most of our plants maintain their soluble oils by the addition of bactericides at regular intervals. At least one plant has installed aeration and flotation equipment on a central soluble oil system which has allowed them to use their soluble oils for several years without replacement.

In many cases the use of centralized systems for soluble oils has provided the opportunity for filtration, chemical treatment or other life extending practices.

Some plants have recovered oils from waste treatment processes and put them to use in the manufacturing plant, either as fuels or, with suitable treatment, as general-use cutting fluids.

Step No. 5: Where a concentrated solution must be replaced from time to time because of the buildup of undesirable materials, see if removal and replacement of small quantities each day will keep the solution in satisfactory condition. Small quantities removed in this way can be handled more conveniently, will require very little special equipment for treatment and may possibly be handled successfully simply by trickling into the normal plant waste flow.

Be sure that careful control is maintained over disposal in this way by using devices which will make sure that no more than the required quantity is discharged from the solution. Manual methods for control of waste disposal by this process are not acceptable.

We are using this technique in processes such as anodizing where buildup of aluminum salts eventually results in a reduction of the efficiency of the operation. Rather than discharge large volumes of the acid when it has reached this point, why not simply remove a smaller quantity continuously, neutralizing by other wastes in the plant. This procedure eliminates the building, operation and maintenance of waste treatment facilities.

Another possible example in this field, which may more properly fall under Step 4, is the removal of small volumes of anodizing solutions for passage through ion exchange systems and return to the anodizing tank. The ion exchange system removes metals which will contaminate the anodizing bath. By setting the flow of concentrated solution from the bath at the proper rate (depending on work loading) the anodizing bath will eventually remain at a static level of impurity well within the optimum efficiency range of the bath.

Step No. 6: Where certain isolated processes contribute the majority of the serious pollution load from the plant, try to separate these wastes from the entire waste flow and handle them separately. This can be combined with a recovery process where such is economical. In some GM plating plants recovery equipment has been installed on the first rinse following acid copper, nickel and chrome plating baths. This recovery equipment has served the double purpose of removing highly concentrated and objectionable wastes from the over-all plant stream and of recovering valuable chemicals for further use in the plating process (Fig. 5).

In one plant, using one of these techniques, chromic acid usage in terms of pounds per assembly plated dropped from 0.241 to 0.025 lb in five years. At the same time, chromic acid concentration in the effluent from the plant dropped from an average of 60 ppm to an average of 3 ppm (Fig. 6).

Step No. 7: Find out if the materials you are wasting are of any use to a neighboring industry, either as a means of neutralizing its wastes or even as a raw material for its process. At the same time, find out if your neighboring industries are throwing away materials of value to your own waste treatment operation.

Two instances come to mind. In the first instance, a plant* was treating large quantities of waste acids at considerable cost. In a review of its waste treatment situation and in an off-hand conversation with the management of a neighboring plant, it found that the waste acid it was discharging could be used as the raw material for fertilizer production. This solved an expensive waste treatment problem to the satisfaction of both parties.

In the second instance, a division was treating waste pickle acids with purchased chemical lime at cost of around $20 per ton. Another division, right across the fence from the first division, was at the same time paying money to have waste lime from acetylene generators hauled to the dump. This waste acetylene lime was actually of higher available calcium oxide content than the chemical lime being bought by the first plant. Negotiation between the two divisions resulted in the first division securing a cheap source of high quality lime and the second securing a ready disposal for its waste acetylene lime.

Step No. 8: Be sure to check with local officials as to exactly what treatment is expected of waste materials entering the sewers. Sludge developed in a waste treatment plant can be the most troublesome and expensive feature of the whole operation. It sometimes happens that by proper manipulation the sludges produced either in plant operations or by inter-action of treatment chemicals are so low in concentration in comparison with the total volume of waste being discharged that no settling or separation devices are necessary. In other words, the sludge can be discharged down the municipal sewer for handling in the municipal treatment works.

This can only be done, of course, with the complete cooperation and approval of the municipal authorities. Careful

*Not associated with General Motors.

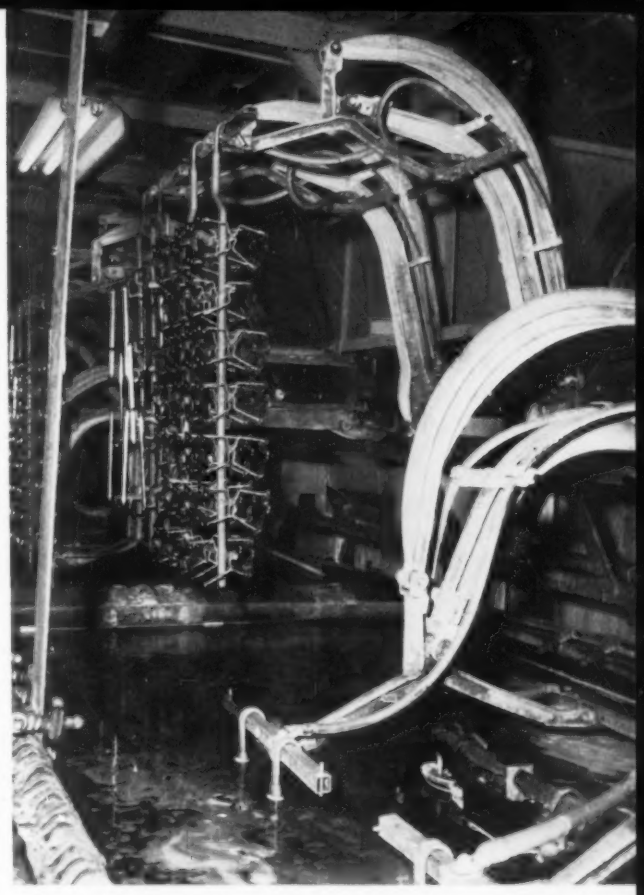


Fig. 4. Plating rack remains suspended above plating solution long enough to permit almost complete drainage of a solution from the parts.

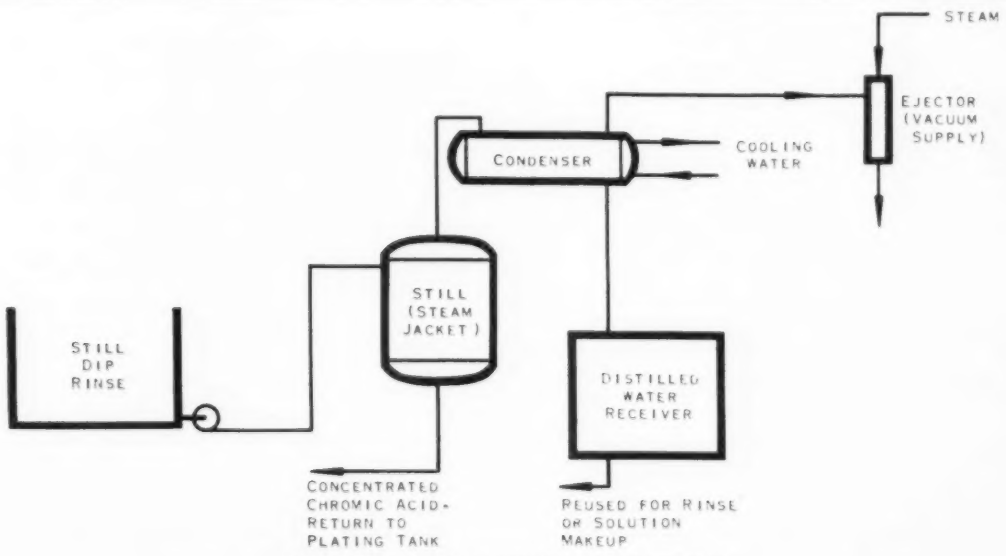


Fig. 5. Chromic acid recovery by vacuum evaporation.

PLANT A	LBS/DAY	COST/LB	SAVINGS/DAY
VACUUM			
CHROMIC ACID	300	30 ¢	$ 90.00
ATMOSPHERIC			
NICKEL SULFATE	200	32.5 ¢	65.00
NICKEL CHLORIDE	30	40.5 ¢	12.00
			$ 167.00
PLANT B			
VACUUM			
CHROMIC ACID	690	30 ¢	$ 207.00

Fig. 6. Chemical savings by rinse evaporation.

control must be established over the uniform discharge of these sludges so that the concentration of suspended matter in the effluent stays within the limits prescribed by the authorities. Obviously, this saves the cost of settling tanks and sludge removal devices, labor and maintenance.

Step No. 9: Be sure that cooling waters are conserved as much as possible. Time is drawing very short for those plants which use water once-through in a cooling operation then discharge it to the sewer. Falling water tables, lowered surface water sources, and general scarcity of water are making it essential that all recovery practices should be placed into operation in manufacturing plants.

Many states are working on drastic modifications to their water resources laws which will require the securing of permits for the use of water from other than municipal sources and the granting of these permits will take into consideration the concept of "reasonable use." It is almost certain that once-through cooling systems will not be considered a reasonable use of water resources.

Cooling waters should be used in circulating systems passing over some heat recovery or heat removal device, such as a spray tower or spray pond. When temperature considerations, or concentration of salts, indicate that they are no longer fit for cooling waters, then they should be used for rinsing, service supply or boiler feed makeup (with adequate treatment).

In a smaller plant, water usage for plating dropped from approximately a million and a half to 780,000 gallons per day in less than a year by application of conscientious conservation measures. These measures not only save money for the industry but are becoming a matter of necessity more and more as the years go by.

Step No. 10: Establish tight control over the waste of solutions in the plant. Let the operators of your processes know the value of what is going down the sewer and what it will do to the sewers, the sewage treatment plant, or the river or lake receiving it.

It is found frequently that waste of chemicals and processing solutions is a matter of poor communications between supervision and operators. If the operator knows why he should help in cutting down wastes, he is more likely to cooperate. If he knows that he is the one who is being harmed when he allows an uncontrolled waste to go down the sewer and that the wastes he is allowing to go down the sewer are contributing to the killing of fish in the local streams or lakes, or to the high cost of operating the sewage treatment plant or water works in his town, then he is much more likely to work toward conservation of materials. The operator will be just as loud as anyone else in condemning a plant for all of the troubles caused by the pollution that he himself allowed to go down the drain.

Set up a course of employe education in the plant, making them acquainted with what can happen when poisonous materials are allowed to go down the sewers uncontrolled and untreated.*

At the Ohio Sewage and Industrial Waste Treatment Conference held in Dayton in June 1956, Mr. Blucher Poole, Chief Engineer of the Indiana State Board of Health, made the following statement:

"Whether industry likes it or not, the time will come when it will be required to furnish positive proof its wastes will have no deleterious effects before it is permitted to put them into a stream."

The author believes that Mr. Poole is right, and further that he is only reading out loud the handwriting which has been on the wall in the field of waste disposal for many years.

General Motors is committed to a wide-open program of cooperation with the stream control authorities for the control of waste disposal into water courses. In some few areas GM has gained from recovering waste materials. In most cases, however, the treatment of the wastes represents a money expenditure which can only be recovered in the cost of the commodity to the consumer.

These are the hard facts of the situation. The cost of treating an industrial waste is part of the cost of manufacturing a product. It must be paid for by the consumer in the end. Any values recovered by prevention of wastes or recovery of materials then become savings in the cost of manufacturing the product. Waste recovery techniques are becoming an integral part of the processing of the finished product.

In the future more and more effort will be demanded from industry to eliminate discharge of harmful wastes. Development of better recovery techniques for expensive chemicals therefore becomes extremely important and will always be the only way to save money through industrial waste control.

*An excellent reference on this subject is a paper written by C. T. Gruner of the Detroit Diesel Engine Division of General Motors Corporation and presented before the Michigan Sewage Works Association at Traverse City in June 1955.

David Milne is supervisor of Materials and Processes for the Production Engineering Section of the General Motors Process Development Staff.

Mr. Milne is a graduate of Wayne University, having earned the BS degree in chemistry in 1936. He was granted his MS degree from Wayne in 1941.

In July of 1936 Mr. Milne joined General Motors as a chemical engineer in the Works Engineering Section of Fisher Body Division. In July 1947 he was transferred to the Production Engineering Section of the General Motors Manufacturing Staff as a chemical engineer, and was promoted to his present position in December 1952.

Mr. Milne entered the United States Army in December 1943, and his service assignments were in the field of engineering. He was separated in March 1946 with the rank of Captain. He is a member of the National Society for Professional Engineers and the Engineering Society of Detroit, and is a registered professional chemical engineer in the State of Michigan.

Mr. Milne has had papers published on chemical engineering subjects, principally in the field of industrial waste control.

HOW TRANS WORLD AIRLINES TREATS PLATING SHOP WASTES

by ROBERT L. GARRETT, ROBERT C. GARLAND and THOMAS SAWYER JR.

This paper was originally presented as a panel discussion on the operation of Trans World Airlines Chemical Waste Disposal. Three members of TWA's Plating shop, Mr. Sawyer, Mr. Garrett and Mr. Garland, made the presentation to the Kansas City Branch of the AES on February 13, 1958, as a three-fold discussion covering Layout, Operation, Reactions and Control.

LAYOUT

TWA's CHEMICAL WASTE DISPOSAL PLANT is used and operated for and by the TWA plating shop only. It is a semiautomatic oxidation and reduction treatment for cyanide and chromium wastes.

The entire operation is housed in or around a two-story building 20 by 40 ft, with a basement 14 ft deep and several treatment basins outside of this building. For appearance and space, the waste treatment plant is located a considerable distance from the overhaul base which houses the plating shop.

Waste solutions and rinse waters come to the treatment plant from the shop in two six-inch sewer lines. All of the waters containing cyanides are diverted into one of the large tanks in the basement of this building. Into the other tank the chrome and acid bearing waters are turned. These two tanks are known as retention basins and will hold up to 25,000 gal of water. They are separated by a dry well in which are installed the pumps, valves, flow meters, etc., which control the flow of these waters. A schematic layout of the entire building is shown in Fig. 1.

The first floor of the building houses the chlorinator, caustic tank, dry chemical feeders, and the instrument panel. The second floor is used as storage for the dry chemicals and the feeders are loaded here in the hoppers which extend from the floor below. At the back of the building are four treatment basins and settling basin, and beyond them is a large lagoon. Figs. 2, 3 and 4 show some of the equipment on the first floor. Fig. 5 is a view of the second floor, Fig. 6 shows one of the treatment basins, and Fig. 7 is the settling basin or cyclator.

METHOD OF OPERATION

This plant is actually two separate processes. Therefore, each process should be discussed by itself up to the point where the products of the treatment are combined into one stream. The following chemical equations show the complete processes in both sides of the dual purpose plant:

* TWA Overhaul Base, Parkville, Mo.

EQUATIONS

(1) $2\,Cl_2 + 2\,Na\,CN \rightarrow 2\,CNCl + 2\,NaCl$

(2) $2\,CN\,Cl + 4\,NaOH \rightarrow 2\,NaCNO + 2\,NaCl + 2\,H_2O$

(3) $3\,Cl_2 + 4\,H_2O + 2\,NaCNO \rightarrow 3\,Cl_2 + (NH_4)_2\,CO^3 + Na_2\,CO_3$

(4) $3\,Cl_2 + 6\,NaOH + (NH_4)_2\,CO_3 + Na_2\,CO_3 \rightarrow 2\,NaHCO_3 + N_2 \uparrow + 6\,NaCl + 6\,H_2O$

(5) $6\,FeSO_4\,7\,H_2O + 6\,H_2\,SO_4 + 2\,H_2CrO_4 \rightarrow Cr_2\,(SO4)_3 + 3\,Fe_2(SO_4)_3 + 50\,H_2O$

(6) $Cr_2(SO_4)_3 + 3\,Fe_2(SO_4)_3 + 12\,Ca(OH)_2 \rightarrow 2\,Cr(OH)_3 \downarrow 6Fe(OH)_3 \downarrow + 12\,CaSO_4$

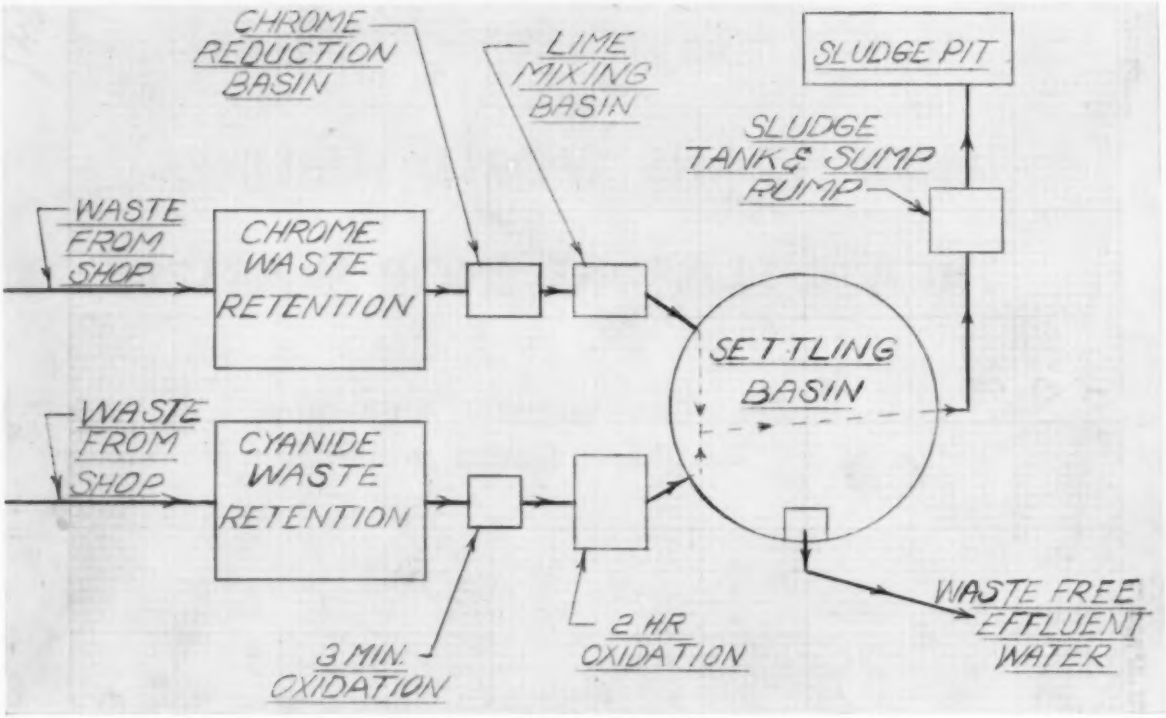


Fig. 1. Schematic of TWA plating shop waste disposal plant.

The cyanide bearing wastes are pumped from the cyanide retention basin into three-minute treatment basin. Here they are treated with chlorine and caustic soda. Cyanide is converted immediately to cyanogen chloride which in time is hydrolyzed to cyanate (equation 1 and 2). From this basin the waste moves to the two hour treatment basin where the cyanate is completely oxidized as shown in equations 3 and 4. From here it is moved to the settling basin where it mixes with the stream from the other side of the plant.

The chrome bearing waste is moved from its retention basin to the chrome reduction basin where it is treated with sulphuric acid and a slurry of ferrous sulphate. The reduction of the chrome from the hexavalent to the trivalent state is shown by equation 5. From here it passes to the lime mixing

Fig. 2. The chlorinator.

Fig. 3. The chemical feeders are shown at the top, pumps in the foreground.

Fig. 4. Instrument panel.

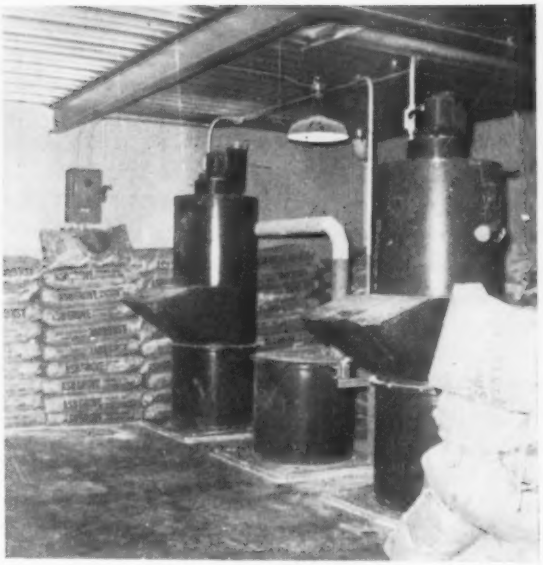


Fig. 5. View of the second floor showing the top of the feeders.

basin where a slurry of hydrated lime is added (equation 6), and it then flows into the settling basin. In the settling basin, crushed limestone is added, which, with the lime, causes the floc to precipitate and settle to the bottom. A sludge pump moves this insoluble waste to the large lagoon where it is dried and removed at intervals. The water in the settling basin flows over a weir and is discharged into a small stream near by, and eventually finds its way into a large river.

METHODS OF CONTROL

To insure the completeness of the various reactions which have been discussed above, this plant is equipped with a fairly complete set of measuring instruments. Fig. 4 shows the panel of *p*H meters and recorders which monitor the streams at various stages of the treatment. In addition to measuring *p*H on this treatment, there are two places where the oxidation-reduction potential (ORP) is determined. In the cyanide treatment, this value is measured and recorded in the two hour basin. In the chrome treatment, it is recorded in a sample taken from the chrome reduction basin, coupled with a proper *p*H value. At that point, the ORP will indicate the completeness of either oxidation or reduction. Besides these two places where both *p*H and ORP are measured, *p*H is also determined in the lime mixing basin, the three minute basin, the settling basin inlet, and at the point where

Fig. 6. Cyanide treatment basin.

Fig. 7. The cyclator.

the waste-free effluent waters leave the settling basin and enter the stream.

Most of these *p*H and ORP values are conventional with treatment plants of this type and there is no need to discuss them in detail. In addition to the recording instruments, several other tests are used which enable the operator to detect changes in concentration and to adjust the feed of chemicals to correspond with treatment needed. Such tests include an ampreometric titration for the presence of free and/or combined chlorine, a spot test which gives a quantitative estimation of cyanide, a visual colormetric estimation of hexavalent chromium, and the use of a portable pocket *p*H meter which will give an instantaneous reading at any place the operator desires. In addition to these tests which are performed in the waste treatment plant, samples may be taken from any point of the system and sent to the plating shop laboratory where complete and accurate analysis can be made.

OPERATIONAL NOTES

One interesting aspect of the operation of this plant which is brought about as a result of continually treating effluent rinse waters which are normally low in waste content and then having to add a quantity of concentrated wastes, is the method used to enable the operator to calculate a stepped-up treatment. When such a material is to be dumped, an anlysis is run in the shop and its concentration is calculated in the volume of water at that time in the retention basin. Prepared charts guide the operator in making such adjustments in chemical feed and water flow when his instruments begin to detect the arrival in the plant of the concentrated waste. Another interesting feature of this continuous type of treatment is the response of the instruments to changes as they occur. Since all of the basins are equipped with continuous agitation, there is only a few seconds lag in the meter when either the *p*H or ORP changes suddenly. It is also worth noting that all of the meters and recorders are equipped with maximum and minimum limit switches which will sound an alarm and activate a warning light when any reading is over or under the established limits.

It is also noted that, while chrome and cyanide wastes primarily are being treated, any heavy metals are precipitated as hydroxides.

The above discussion of TWA Waste Disposal Operations was given to the Kansas City Branch AES, not so much as an ideal method of performing this work, but as an example of how this job can be accomplished. At the time, the members were told that certain changes and improvements were contemplated. These were suggested after almost one year's operation in this new plant. This plant has performed very well in the time it has been in operation and its performance has been and is an important part of the successful operation of a plating shop by Trans World Airlines in accomplishing overhaul of aircraft engines and other aircraft components.

Robert L. Garrett was born in Bluefield, West Virginia. After attending the University of Illinois, he was a civilian instrument mechanic for the USAAF during World War II. Mr. Garret has been with TWA for 13 years, first as instrument mechanic and for the past six years as solution control chemist in the plating shop.

He is a member of Kansas City Branch of the AES and has been Branch secretary since 1957.

Robert C. Garland was born in Archie, Missouri. He was graduated from Gonzaga University, Spokane, Washington in 1950 with a BS in chemical engineering. He has worked in the plating departments of the American Lead and Zinc Co., Bendix Aviation in Kansas City and General Motors Corp. in Kansas City. He has been foreman in TWA's plating facility for three years.

Mr. Garland is a member of the Kansas City Branch of the AES.

Tom Sawyer Jr. was born in Trenton, Missouri and educated there. He was foreman of a plating shop in a Kansas City manufacturing plant for six years before joining TWA as a mechanic in their plating facility. Mr. Sawyer has been operator of the airline's new waste disposal plant since the time of its activation.

He became a member of the AES Kansas City Branch in 1953, the year the branch was chartered.

BIBLIOGRAPHY ON METAL FINISHING WASTES, 1957

by C. F. Gurnham and D. G. Foulke

THIS LISTING continues the 1955 and 1956 bibliographies which were published in the June and August, 1957, issues of PLATING. Additions to the list will be appreciated.

No attempt has been made to include general articles on industrial wastes unless metal finishing wastes are discussed in detail. Organic finishing wastes are not included. Analytical methods for metal ions are not included unless the articles relate specifically to effluents from metal finishing operations (the analysis of cyanide is, however, included).

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PREVIEW OF FUTURE PLATING ISSUES

●

NOVEMBER 1958

AIRCRAFT. Electroplating and metal finishing in the aviation industry will be featured in this second annual edition.

●

THE SEPTEMBER, OCTOBER and DECEMBER issues loom as strong 1958 General Issues.

●

JANUARY 1959

ABRASIVES AND MECHANICAL FINISHING. Developments in the various finishing methods will be featured in this annual issue.

●

MARCH 1959

ORGANIC COATING. The importance of organic finishing to electroplaters is increasing rapidly. New and review material will be presented.

●

JUNE 1959

GOLDEN JUBILEE. A large feature issue climaxing the Fiftieth Anniversary observance of the American Electroplaters' Society, PLATING's parent, it will be targeted both for immediate interest to PLATING's global circulation and for long retainment as an AES reference source and as a memento of this year-long observance.

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Get the extras that cut costs and guarantee consistent results... Competitively tested materials, comprehensively and conscientiously serviced by a nationwide network of sales engineers and distributors. Federated's materials include new ASARCO-MAX COPPER anode, triple-life Conducta-Core lead anode, copper, zinc, tin, tin-lead, cadmium, brass and silver anodes. Nickel salts. Zimax, Nimax, Cadmax brighteners. New Conmax conversion coatings for zinc and cadmium plated parts. Federated Metals Division of American Smelting and Refining Company, 120 Broadway, New York 5, N. Y. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal.

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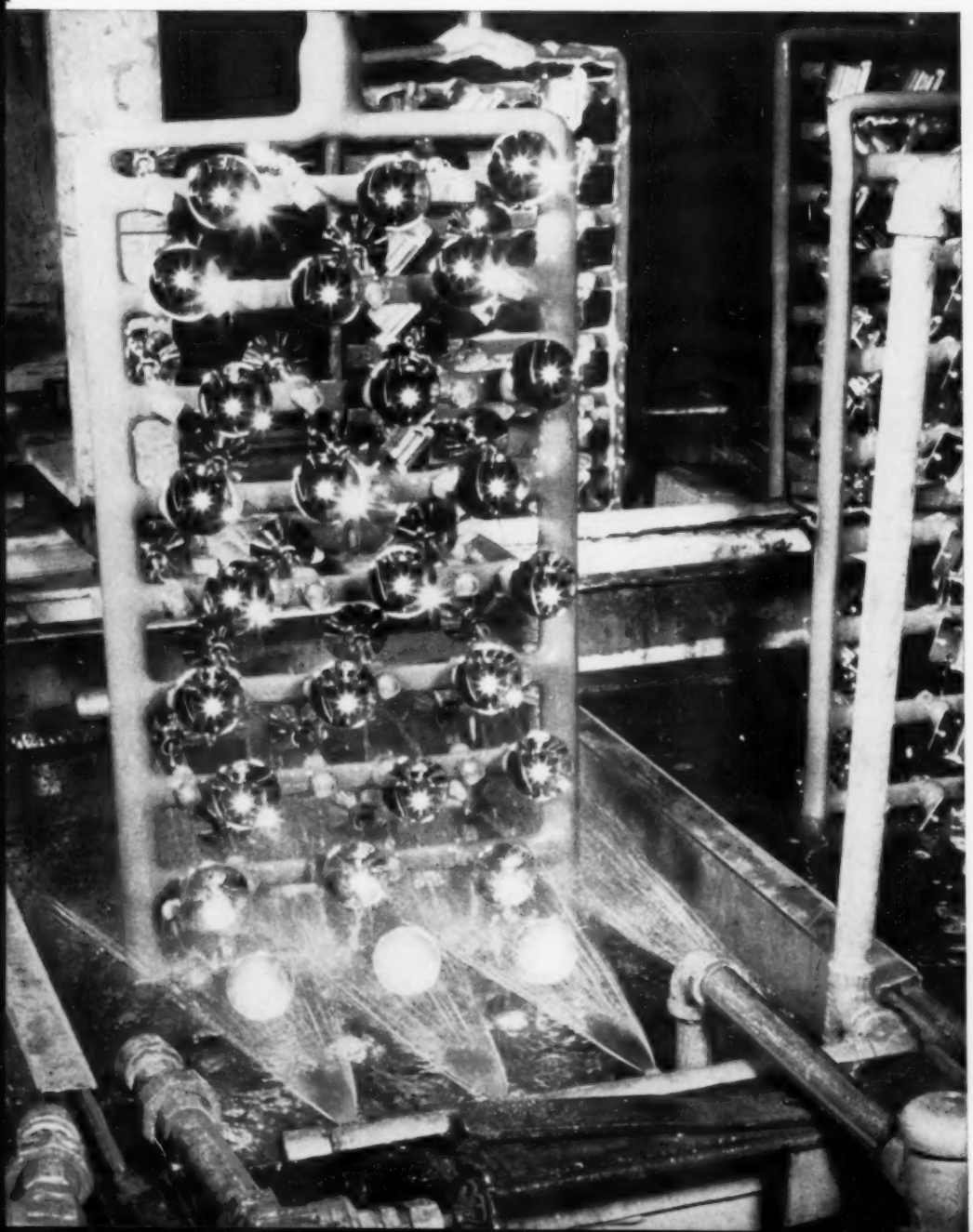

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

GRAVER SYSTEMS *SIMPLIFY* TREATMENT OF COMPLICATED PLATING WASTES at MARTIN-ORLANDO

Building missiles is a complex job. Thousands of intricate parts must be machined to close tolerances and plated or coated with a wide variety of materials to resist corrosion and guarantee dependable performance during flight. Many are chrome plated, silver plated, anodized, phosphatized, pickled, passivated or processed in other ways. An unusually large number of acid and chemical wastes results, including nitric acid, hydrofluoric acid, sulfuric acid, caustic and cyanide. Handling these wastes is a complex problem in itself.

Martin-Orlando of Florida, builders of guided missiles, selected Graver to supply all units and auxiliary equipment for a treatment plant based on plans and specifications prepared by the Architect-Engineers. Graver, working with the consulting engineers, fabricated and installed a plant which handles this treatment problem simply and directly. Four integrated systems effectively treat all wastes in the spent baths and rinse. The plant is safe, efficient and simple to operate and maintain.

This installation is only one of the many modern plating waste treatment systems Graver has furnished for large and small manufacturers in every field. Graver supplies all types of equipment, from simple units to entire plants and makes available a complete service, including research and development, manufacturing and installation, when required. Whatever *your* waste treatment requirements, Graver has the modern designs, equipment and processes to do the job efficiently . . . economically. Every installation is tailored to specific needs.

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MILESTONES OF AES

A PLATING MAGAZINE original feature during this observance fiscal year of the FIFTIETH ANNIVERSARY of its parent, American Electroplaters' Society, Inc.

ON MARCH 6, 1909, in the first year of the administration of President William Howard Taft—a half-century ago when the United States itself was a union of 46 states with a population of about 90 million, and when the average salary of foremen platers was some $27.50 weekly—Charles H. Proctor, a farsighted New Jersey plating and foundry supervisor, achieved his cherished dream by inspiring a meeting of some two-dozen foremen platers at the old Hotel Chelsea in New York City for the purpose of creating a non-profit association for the advancement of electroplating, metal finishing and allied arts.

FRIDAY, March 19, the same pioneering group, with some enthusiastic additions, met again, this time at Knickerbocker's historic Astor House, for further consideration and action. Out of their thinking and planning, the National Electro-Platers Association of the United States and Canada (NEPA) came into formal being at an organization meeting held at the Chelsea Hotel, Saturday, April 10. There, the infant association's Constitution and Bylaws were approved by 60 Charter Members, and Founder Charles H. Proctor was elected NEPA's first President, with Nathan F. Emery named Treasurer and B. W. Gilchrist voted Secretary. NEPA became incorporated as a New York corporation on October 18, 1909, the trailblazing ancestor of today's American Electroplaters' Society (AES).

WITHIN three months of its incorporation, NEPA conducted its first annual banquet, forerunner of today's AES Annual Conventions—a sumptuous affair held January 15, 1910 at the old Hotel Marlborough in New York. And by October 10 of that same year, with Philadelphian F. C. Clement as bellwether, NEPA had entered Philadelphia by the launching of a Branch in that community that day.

NEEDING a medium of its own through which to enrich the technical knowledge of its swelling membership, NEPA inaugurated a quarterly magazine in June 1910 titled "QUARTERLY REVIEW", progenitor of "MONTHLY REVIEW" and of today's PLATING MAGAZINE.

THOUGH NEPA's headquarters was then located in New York City and its members met at 309 West 23rd Street on the first Friday evening of each month, its first Editorial Office was in the Jersey City home of its first editor, August G. Hoffman. Elected Librarian of NEPA in May 1909, the late George B. Hogaboom (New York) assumed the editorship of "QUARTERLY REVIEW" in March 1911, and under his guidance—aided by such Associate Editors as Adolph Wahl (Rochester, N. Y.); Amos G. Reeve (Niagara Falls); Royal F. Clark (New York); John E. Grant (Lynn, Mass.); Frederick C. Clement (Philadelphia) and Charles H. Proctor (Arlington, N. J.)—the quarterly made rapid headway. That same year, by the way, NEPA penetrated Rochester, N. Y. with a dynamic Branch.

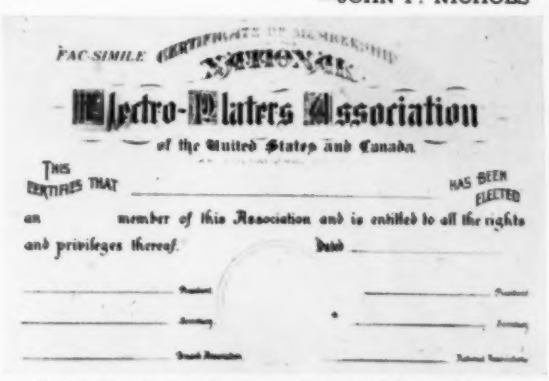
THE YEAR 1912 saw NEPA, now with 144 Active Members, make even greater progress. It became international in stature by the genesis of a Branch in Toronto, Canada. It also chartered Branches during that eventful year in Indianapolis, Detroit, Chicago and St. Louis. And its Third Annual Banquet, an historic event that occurred Saturday, February 12, 1912 just two months before the sinking of the Titanic, concurrently featured the Association's first Industrial Finishing Exposition.

BUT 1913 was an even more eventful period for burgeoning NEPA. It assimilated its growth that year by reorganizing itself on June 1, 1913 as the American Electroplaters' Society, today's AES, with a membership numbering over 350. With the creation in 1913 of the Newark, Milwaukee, Dayton, Cincinnati and Buffalo Branches, the Society then boasted 13 chartered Branches, these spanning (East to West) from New York to St. Louis, (North to South) from Toronto to St. Louis.

TO EFFECT its transition, AES conducted its First Annual Convention on June 1, 1913, a memorable event staged in New York City with Founder Charles H. Proctor presiding. At that first Annual Meeting of the Supreme Society, AES inducted its first National Officers, namely George B. Hogaboom (New York), President; Colonel J. H. Hansjosten (Chicago), First Vice President; W. S. Barrows (Toronto), Second Vice President; John J. Schultz (Detroit), Treasurer, and H. E. Willmore, (Chicago), Editor.

IN 1914, Austrian Grand Duke Ferdinand was assasinated in Sarajevo, Serbia, thereby impelling Europe into World War I. On this continent, meanwhile, the AES accelerated its mission of stimulating education in electroplating, metal finishing and allied arts by broadening the frequency and usefulness of its official journal. In June of that year, with H. E. Willmore as Editor-in-Chief, "QUARTERLY REVIEW" became "MONTHLY REVIEW", the immediate forerunner of AES's PLATING MAGAZINE of today.

—JOHN P. NICHOLS


FAC-SIMILE CERTIFICATE OF MEMBERSHIP

NATIONAL

Electro-Platers Association

of the United States and Canada

THIS CERTIFIES THAT _____ HAS BEEN ELECTED

an member of this Association and is entitled to all the rights and privileges thereof. Date _____

_____ President _____ President

_____ Secretary _____ Secretary

_____ Treasurer _____ Treasurer

Earliest Membership Certificate of National Electro-Platers Association, Circa 1910.

GOLDEN JUBILEE CONVENTION/EXPOSITION AS AES's GOLDEN JUBILEE CLIMAX

MICHIGAN's DETROIT, world renowned metropolis that will be locale of the Golden Jubilee Convention and Industrial Finishing Exposition climaxing the FIFTIETH ANNIVERSARY observance of the American Electroplaters' Society, Inc. (AES), June 15–19, 1959, has lived under three flags in its 255-year lifetime.

A tiny wilderness settlement nestled on the banks of the pungent Detroit River when fathered by Antoine de la Mothe Cadillac back in 1701, it abandoned France's colors in 1760 when that nation yielded possession to the British. And when "Mad Anthony" Wayne stormed and conquered the fort at Detroit in 1796, the Stars and Stripes were unfurled over the community for keeps.

Since that far-off day, Detroit has become one of the world's leading cities, both in point of size and in reputation and prestige for its abundant manufactured products that are known and employed globally. Moreover, it has taken giant strides forward in the development of civic and cultural facilities.

Against this backdrop, the AES will conduct there, its expectedly sizable convention and exposition, including the Fifth International Conference on Electrodeposition and Metal Finishing, that will be the summit events of the year-long observance of its GOLDEN ANNIVERSARY. Its Detroit Branch, largest of its chartered affiliates and a veteran of four AES Annual Conventions conducted in the past under its aegis as Host Branch (1918, 1929, 1934 and 1947), is leaving no stones unturned to make this the most generally significant AES national assembly in the Society's half-century existence.

"DETROIT'LL SHINE IN '59"

WITH THE pageantry of a "once-in-a-lifetime" FIFTIETH ANNIVERSARY observance as background, the Golden Jubilee Convention will provide substantial educational and relaxation fare. As the Fifth International Conference on Electrodeposition and Metal Finishing, its educational sessions will feature technical and scientific papers delivered by the cream of American and foreign experts. The Conference's "leadoff" event, in fact, will be the widely anticipated "William Blum Lecture" to be presented by Dr. William Blum, the AES's first "AES Scientific Achievement Award" winner, highest honor bestowed upon a distinguished scientist by the American Electroplaters' Society.

The Industrial Finishing Exposition is expected to assemble for industry display, the products of the largest number of American sources of supply in AES history. Here, thousands of viewers will pass through the aisles of the city's Engineers Armory to examine the lines and latest product developments of the market's suppliers. Among other features, will be the historical and status exhibits of the AES itself and of its PLATING MAGAZINE and Research Program, keystones of its broad program. Aloft will be the Golden Jubilee flag accentuating the important anniversary.

Detroit's Hotel Statler will be the Headquarters hotel, with a number of others, including the Sheraton-Cadillac, supplementing. As in Montreal and Cincinnati, the registration fee (male or female) will be $20 per person. Free bus service will be provided between the hotel and the Armory. Morning educational sessions will be held at the hotel, afternoon sessions at the Armory. Restaurant service will be available at the Exposition. Plant visitations will play an important part in the expected success of the Golden Jubilee Convention.

Signs at the recent Cincinnati Convention held, "Detroit's da place in '59." Judging by plans to date, PLATING adds, "*DETROIT'LL SHINE IN '59.*"

The heart of Detroit's downtown business section from Grand Circus to the Detroit River.

AES NEWS

SIXTEEN BIG AES MEETINGS ALREADY SCHEDULED FOR 1958-1959

Scheduled dates for many of the AES's Regional and Branch events for the autumn 1958 and winter 1959 season of the Society's FIFTIETH ANNIVERSARY have already become known. These include these dates of occurrence of the AES's four of five Regional Annual Meetings:

DIXIE: Dinkler Plaza Hotel, Atlanta, Georgia, February 13-14, 1959 concurrently with the AES's SIXTH INTERIM MEETING of the Supreme Society. The Southeastern Branch will be Host Branch. Blue Ridge and Miami are also members of the group.

EMPIRE STATE: To be held in Buffalo, N. Y., April 11, 1959 with the Buffalo Branch as Host. This region also includes the Capitol District, Mohawk Valley, Syracuse, Rochester and Southern Tier Branches.

NEW ENGLAND: Waterbury Branch will serve as Host for this regional to be held in Hartford s Hotel Statler, April 18, 1959. Member Branches include Bridgeport, Hartford, New Haven, Springfield.

TRI-STATE: Louisville will host this regional to be held in that city, April 4, 1959. Other participating Branches include Columbus, Cincinnati, Indianapolis, Dayton.

With a FIFTIETH ANNIVERSARY background and with the Executive Board present, the Baltimore-Washington Branch's traditional Annual Meeting at which the National President will receive his "pot" of the Order of Past Presidents will be held April 11, 1959.

Major Branch Annual Meetings whose dates are already known include:

MONTREAL—October 4, 1958
PHILADELPHIA—October 31-November 1, 1958
DETROIT—December 4-5, 1958
NEWARK—December 12-13, 1958
GRAND RAPIDS—January 17, 1959
CHICAGO—January 31, 1959
CLEVELAND—January 31, 1959
NEW YORK—February 7, 1959
DAYTON—March 7, 1959
ROCKFORD—March 7, 1959

With the Dixie Regional Group selected by the Supreme Society as sponsor, and the Southeastern Branch as Host Branch, the SIXTH INTERIM MEETING will occur at the Dinkler Plaza Hotel, Atlanta, Georgia, Saturday, February 14, 1959. The Executive Board will hold a full-day's meeting on Friday, February 13 continuing on Sunday, February 15.

1958 TECHNICAL PROCEEDINGS IN PREPARATION

Containing the papers delivered before the Educational Sessions of the recent 45th Annual Convention, held in Cincinnati, Ohio, May 19-22, 1958, including the discussions that attended the delivery of each of these technical and scientific papers, the 1958 Edition of the AES's TECHNICAL PROCEEDINGS is already in preparation for publication. Expected to be even a larger book than the 1957 edition, members' copies are expected to be enroute to them even sooner this Autumn than last which broke all AES records for early appearance.

The Golden Jubilee Flag that will fly at AES meetings.

TROPHY donated by the Activites Committee of the Springfield Branch.

THE COLIN HASTIE MEMORIAL TROPHY

This memorial was created as a token of esteem to the memory of Colin McNair Hastie, a charter member of the Springfield Branch, and was donated by the Activities Committee of the Branch, on Saturday, June 14, 1958.

This award will be presented annually to the local Branch member with the lowest gross golf score at the Annual Golf Outing. Any one member winning this trophy twice shall retain permanent possession, and it shall so be retired *unless* that member voluntarily returns it to future competition.

The first winner of the award is Elery C. Gibson, at the Whippernon Club, in Russell, Mass. "Gibby" has just been installed as first vice president of the Branch for this coming season.

Colin McNair Hastie first joined the AES back in 1935 when the Springfield Branch obtained its charter. He was a supervisor in the plating department at Westinghouse Electric and was active in Westinghouse Electric. He was active in the Branch until his recent fatal illness. He died on Sunday, April 28, 1958.

Henry Heissfield

TORONTO CONTRIBUTION

An item in the June 1958 issue stated incorrectly the Toronto Branch had contributed $100 to the AES Research Fund. The Toronto Branch contribution was in the amount of $180, nearly twice the figure previously published through inadvertence.

INTERSOCIETY NEWS

ASM ELECTROPLATING COURSE

Amplification of the broad and scientific curriculum of the Metals Engineering Institute, a division of the American Society for Metals, continues with the recent addition of a new course in "Electroplating and Metal Finishing."

This course has been prepared for the Metals Engineering Institute by one of the nation's foremost electrodeposition experts in the country, formerly a member of the National Bureau of Standards for more than 40 years—Dr. William Blum. The course is designed to cover broad chemical and physical principles underlying coating processes. It also touches upon specific practices in treating particular metals.

Fifteen lessons comprise the course with one-half of the lessons presenting such topics as electricity, electrical equipment, polarization, and current and resistance. In addition there are lessons on preparation of metals for plating and the structure and properties of electrodeposits. Specific discussions present the handling of copper, silver, gold, zinc, cadmium and other rare metals. Electroforming, electrowinning and electrorefining complete the course.

The Metals Engineering Institute offers courses in all phases of metallurgical instruction available for home study or in-plant training programs. Further information may be had by inquiry directed to the Metals Engineering Institute, 7301 Euclid Avenue, Cleveland 3, Ohio.

AMERICAN SOCIETY FOR ABRASIVES EXPANDING

The expanded program proposed at the quarterly meeting of the Board of Directors of American Society for Abrasives held April 19–20, 1958 at Hotel Elysee, New York City was approved and adopted by the society.

As outlined by John Y. Arnold, president of ASA, key points in the program for the coming year include establishment of an annual National Abrasives Conference, publication of a monthly newsletter for members, development of an information center and library, establishment of industry awards and citations, as well as the creation of a speakers bureau, film reference library, placement service, and the sponsoring of research projects.

The extensive program for the coming year is planned to help attain the society's objectives of increased understanding, wider use, and broader knowledge of all facets of industrial applications of abrasives. To help with the creation and direction of the overall program, the ASA has appointed a public relations counsel.

A charter has been granted to a new chapter, Long Island Chapter No. 8.

FIRST PLASTICS ENGINEERING DEGREES AWARDED

On June 15, 1958 the first plastics engineering degrees ever to be conferred were granted to eight graduates of Lowell Institute of Technology, Lowell, Massachusetts. Twenty-three members of the class of 1959 are expected to receive the same BS degree in plastics engineering one year hence.

To recognize this event and to honor the recipients, three national officers of the Society of Plastics Engineers, Inc. traveled to Lowell to participate in a special meeting of the plastics engineering graduates and faculty members. SPE national president, R. K. Gossett; national director representing the SPE Eastern New England Section, Ralph L. Mondano; and SPE executive secretary, Thomas A Bissell, addressed the group.

1959 CORROSION SHOW AND CONFERENCE

The 1959 Corrosion Show of National Association of Corrosion Engineers, held concurrently with the NACE 15th Annual Conference, will be in the same building in which technical symposia and technical committee meetings will be held. The show and conference will be held in the Sherman Hotel, Chicago, Ill., March 17–19, 1959. Corrosion Show booths will be located in the mezzanine and exhibition hall area of the hotel.

The hotel has recently been remodeled and special provisions have been made for the speedy and efficient handling of exhibit material. With the show and the conference in the same building, no time will be lost going to and from the exhibition and those attending the technical sessions can get to the show at all times.

Complete information may be obtained from R. W. Huff Jr., National Association of Corrosion Engineers, 1061 M & M Building, Houston 2, Texas.

Photograph Courtesy of Plating Management

Annual award to New York Plating Man-of-the-Year was made during the 40th annual banquet of the Masters' Electro-Plating Association at the Hotel Astor, New York City on June 14. (Left to right) Frank Kaiser, MEPA secretary-treasurer, who made the presentation; Mrs. Ranno, wife of the recipient, was presented with a bouquet of roses; and Mariano Ranno, Plating Man-of-the-Year. The affair, one of the social highlights of the industry, was attended by about 300. Dancing and entertainment added to the enjoyment of the evening. Favors were received by all of the guests.

INDICATE A 833. ➤

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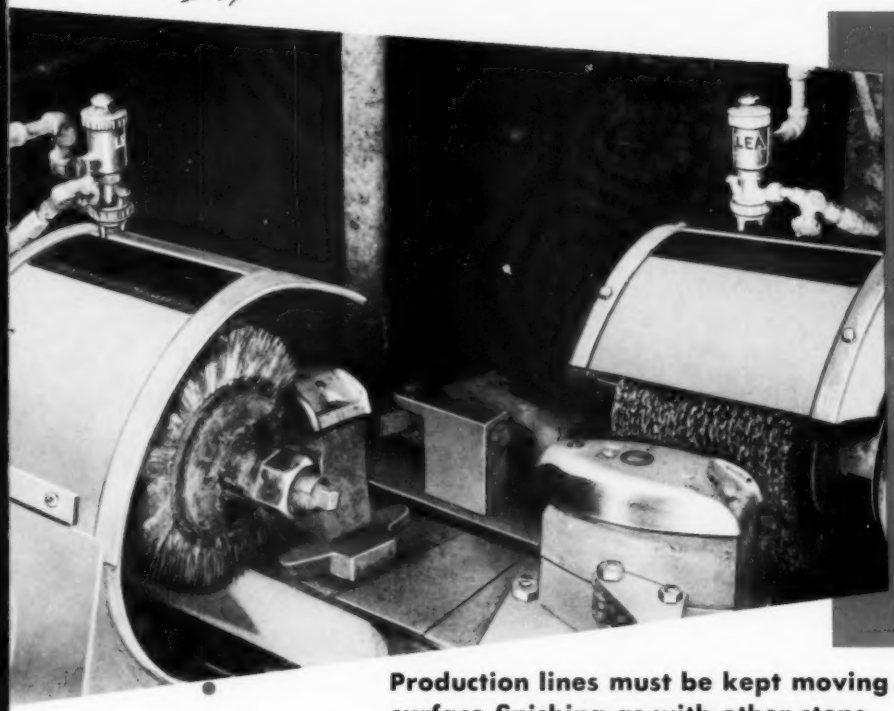

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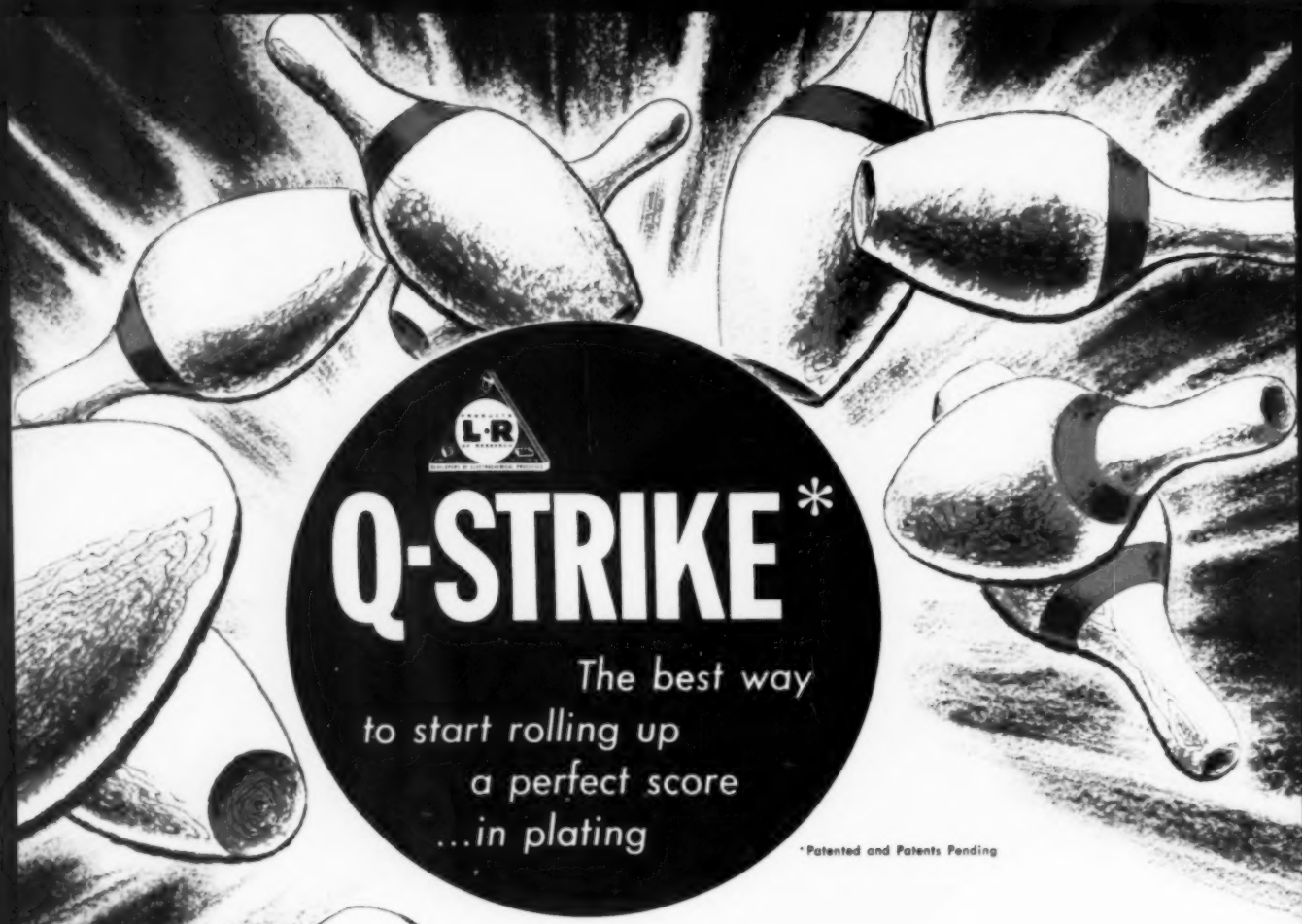

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Charter presentation on June 25 marked the affiliation of the Metal Finishing Association of Southern California with the National Association of Metal Finishers. From left, Harold E. Coombes Sr., Crown City Plating Co., El Monte; Meeting chairman Walter P. Behlendorf, Spence Electro Plating Co., Los Angeles; NAMF president, George W. Taylor; Harold E. Coombs Jr., Crown City Plating and 1960 NAMF convention co-chairman.

METAL FINISHERS ORGANIZE IN SOUTHERN CALIFORNIA

Fifty-five Southern California metal finishing concerns were represented at a recent charter meeting of a new regional association of the National Association of Metal Finishers in Los Angeles. The new group will be known as the Metal Finishing Association of Southern California.

According to a NAMF report, the local organization effort was due mainly to the efforts of NAMF board member Harold E. Coombes, Crown City Plating Co., El Monte and Walter P. Behlendorf, Spence Electro Plating Company, Los Angeles, who acted as meeting chairman.

George W. Taylor of Adel, Georgia, NAMF president, presented the new group with its national charter, assisted by Executive Secretary Peter Kovatis. Mr. Taylor, president of Production Plating Co., Adel, Georgia and D&L Plating Co., Carrollton, Georgia, spent three days in Southern California conferring with owners and operators of job plating shops.

He underscored the "great need for the job shop plating industry to get the proper recognition" for their pressing problems. On the subject of Government competition, the metal finishing leader cited instances in many areas of the country, including California, where prime and subcontractors were "abusing SBA regulations."

The local NAMF affiliate will play host to the 1960 convention of job shop owners at the Statler Hilton Hotel where preliminary arrangements for the conclave were firmed up recently.

NACE NORTHEAST REGION TO MEET IN BOSTON

Forty papers on corrosion will be presented at the Northeast Region Meeting of the National Association of Corrosion Engineers. The meeting will be held in Boston, Mass., October 6–8, 1958.

The papers will be presented in seven symposia. There will be two sessions each for three of the symposia, Theory and Principles of Corrosion, Marine Corrosion and Cathodic Protection.

Members of technical committees will meet and exchange information on how to solve their common corrosion problems.

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FOUR HONORED BY ASTM

John L. McCloud, formerly manager of manufacturing research of the Staff Manufacturing Engineering Office of the Ford Motor Co. (retired) and currently a consulting editor of Metal Progress magazine, was one of four men honored June 24 when he was presented with a certificate of his election to Honorary Membership in the American Society for Testing Materials. This presentation was made during the 61st Annual Meeting of the Society at Boston, Mass.

John Lansford McCloud is a native of Detroit, Mich., and a graduate of the University of Michigan (BChE, 1913). He was employed by Ford from 1915 until his retirement in 1956.

He is a member of the American Chemical Society, American Society for Metals (life member), the Engineering Society of Detroit, Society of Automotive Engineers, Institute of Metals, Society of Chemical Industry, American Institute of Chemical Engineers and the American Electroplaters' Society.

Since his retirement from the Ford Motor Company, he has become a consulting editor for Metal Progress.

Herbert J. Ball, former professor of textile engineering at the Lowell Institute of Technology, also was presented with a certificate of Honorary Membership.

Professor Ball was graduated from M.I.T. in 1906 with the SB degree in mechanical engineering. He joined the faculty of Lowell Technological Institute and retired in 1955 after 49 years of continuous service. He was head of the textile engineering department and later chairman of the Division of Engineering at the Institute. Prof. Ball served as acting president of the Institute for several months in 1945–46 during the absence of the then President Kenneth R. Fox.

Prof. Ball has been active in the affairs of the American Society for Testing Materials since 1929. He has served as a member of the executive committee, vice president and president of the society and on various other committees of the organization.

Honorary Membership was conferred upon James G. Morrow, metallurgical engineer of Steel Company of Canada, Ltd. He began his work at that company as assistant chemist, becoming successively chief night chemist, inspecting engineer, and metallurgical engineer.

Mr. Morrow's technical associations have been varied. In 1917 he became a member of the Canadian Standards Association and was appointed chairman, which post he held until 1936. He worked for many years to bring about unification of techniques with Britain, the United States, and Canada.

During World War II, he was known for the development of "Morrow" steel and was technical advisor to the Government Steel Controllers. He was largely responsible for the organization of the Canadian Ordnance Association, later the Canadian Industrial Preparedness Association, of which he was a director and is now president.

Truman S. Fuller, formerly engineer in charge of the Works Laboratory, General Electric Co., and currently metallurgical consultant, received Honorary Membership in the ASTM.

A native of Saratoga Springs, N. Y., he was graduated with a BS in chemistry from Syracuse University in 1911. He joined GE as a chemist at the Edison Lamp Works, Harrison, N. J. Later he was transferred to the GE Research Laboratory in Schenectady as metallurgist. In 1938 he entered the Works Laboratory as engineer of materials and five years later became assistant engineer of that division.

Mr. Fuller was appointed engineer in charge of the Works Laboratory in 1945 and continued in that position until his retirement in 1953. Since that time he has acted as metallurgical consultant.

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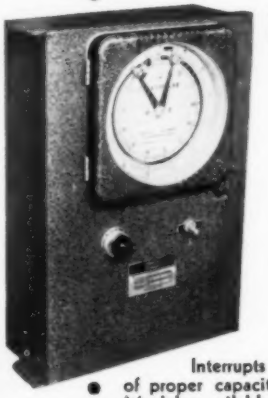

Interrupts voltage to main line starter of rectifier feeding current to plating tank, where interruption is desired. Capable of handling rectifiers with capacity ranges from 500 to 10,000 amps.

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PATENT ABSTRACTS

DR. D. GARDNER FOULKE
Manager, Electrochemical Development
Hanson-Van Winkle-Munning Co.
Matawan, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,819,192, 1/7/58—Aluminum Treatment—J. Young, assignor to E. I. duPont de Nemours and Co., Wilmington, Del.

A method is described for forming an oxide film on an aluminum surface by exposing to a 0.1 to 1 per cent aqueous hydrogen peroxide solution at a *p*H of 10.5 to 11.5. One claim discloses the use of 1.0 per cent sodium perborate at a *p*H of 11.0.

10 claims.

No. 2,825,684, 3/4/58—Bright Copper Plating—C. Wernlund, assignor to E. I. duPont de Nemours and Co., Wilmington, Del.

A dual brightening agent for cyanide copper plating is described as containing 0.612 to 6.12 g/l of metallic selenium (oxide, selenous and selenic acids, etc.) and a soluble compound of a metal (Cd at 0.007 to 7 g/l Bi at 0.002 to 0.05 g/l and silver 0.008 to 1.62 g/l).

6 claims.

No. 2,827,430, 3/18/58—Plating Rack—V. McGibbon, et al, assignor to Lukens Steel Co., Coatesville, Pa.

A plating rack for heavy workpieces is described.

9 claims, figure.

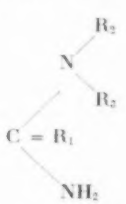
No. 2,828,251, 3/25/58—Electrolytic Cladding—M. Sibert and J. Burwell, assignors to Horizons Titanium Corp.

A method of plating Ti, Va, Hf, Zr, Ta, and Cb, on a base metal consists of plating out of a molten halide bath.

5 claims.

No. 2,828,252, 3/25/58—Electrodeposition of Bright Zinc, Copper or Nickel—F. Fischer, assignor to Deutsche Gold- und Silber-Scheideanstalt, Frankfort, Germany.

The addition agent is described as at least 0.5 g/l of a condensation product of an unsaturated aldehyde (acrolein and its alpha substitution products) and urea of the formula



wherein R_1 consists of O, S, and imin radicals. R_2 and R_3 are H, alkyl, alkenyl, aralkyl and acyl groups of saturated and unsaturated acids.

12 claims.

No. 2,828,254, 3/25/58—Forming High Friction Element—F. Fahnoe and J. Shyne, assignors to Vitro Corporation, Verona, N. J.

By electrophoresis a particle matrix of nickel or copper oxides is laid down followed by a friction material (molybdenum disilicide or alumina), then heating in a reducing atmosphere.

3 claims.

No. 2,828,255, 3/25/58—Plating Apparatus—E. Gempes, assignor to Wurttembergische Metallwarenfabrik, Geislingen, Germany.

An apparatus for producing locally thickened electrodeposits is described. See also No. 2,828,256 with 1 claim.

1 claim, figure.

No. 2,829,035, 4/1/58—Buffing Composition—S. Doughty and Ellsworth T. Candee, assignors to The Lea Mfg. Co., Waterbury, Conn.

The composition consists of 10 to 60 per cent grease selected from the group consisting of higher fatty acids, their glycerides, and their ester waxes, and from 30 to 80 per cent by weight of a finely divided abrasive, said grease having intimately dispersed therein from 1 to 15 per cent by weight of a non-ionic surface-active emulsifying agent selected from the group consisting of condensation products of alkylene oxides and fatty acids containing 12 to 18 carbon atoms, condensation products of alkylene oxides and fatty alcohols containing 12 to 18 carbon atoms, condensation products of alkylene oxides and rosin acids, condensation products of alkylene oxides and partial esters of hexitol anhydrides and fatty acids containing 12 to 18 carbon atoms, condensation products of alkylene oxides and amides derivatives of hydrogenated tallow fatty acids, condensation products of alkylene oxides and alkyl phenols, condensation products of alkylolamines and fatty acids containing 12 to 18 carbon atoms, condensation products of polyoxypropylene and ethylene oxide, glycol esters of fatty acids containing 12 to 18 carbon atoms, partial esters of hexitol anhydrides and fatty acids containing 12 to 18 carbon atoms, glycol esters of rosin acids, and partial esters of hexitol anhydrides and rosin acids, said composition being characterized by emulsifying readily in water to form an emulsion in which the abrasive particles are grease-coated and stably dispersed in the aqueous phase.

11 claims.

No. 2,829,077, 4/1/58—Galvanizing Flux—D. Speed, assignor to E. I. duPont de Nemours and Co., Wilmington, Del.

The flux consists of a material selected from the group ammonium chloride, zinc chloride and zinc ammonium chloride and the condensation product of oleyl alcohol with about 10 moles of ethylene oxide (0.02–0.5 g/100 g of flux).

5 claims.

No. 2,829,091, 4/1/58—Electroplating Titanium—Leo Missel, assignor to Menasso Mfg. Co., Burbank, California.

Immerse in 0.5 to 20 per cent by weight of HF and 15 per cent to saturation of a chromium compound selected from chromic acid and its salts then electroplate in a plating solution.

9 claims.

No. 2,829,092, 4/1/58—Manufacture of Aluminum Alloys—J. Andrieux, et al., assignors to Society d'Electro-Chemie d'Electrometallurgie, Paris, France.

To make aluminum—calcium alloys electrolyze calcium aluminate dissolved in an alkali metal, alkali earth or magnesium molten halide bath.

8 claims.

No. 2,829,097, 4/1/58—Electropolishing Molybdenum—E. Bowerman and E. Saubestre, assignors to Sylvania Electric Products Co., Mass.

The method describes making the molybdenum the anode in

a H_2SO_4-HCl electrolyte present in the volume per cent within the defined area of a ternary diagram, water—H_2SO_4-HCl. See also No. 2,829,098 describing the electropolishing of nickel with a sulfuric acid–hydrochloric acid electrolyte (5 claims).

9 claims.

No. 2,830,014, 4/8/58—Electroplating Process—W. Gundel, W. Strauss, and H. Haas, assignors to Dehydag, Deutsche Hydrierwerke G.m.b.H., Dusseldorf, Germany.

The electroplating bath for copper, zinc, and nickel consists of an acid solution of at least one inorganic salt of the metal to be electrodeposited and from 0.01 to 20 g/l of a sulfonic acid compound having a structural formula selected from the group consisting of

$$R—S—R_1—SO_3H$$

and

$$R—Y—S—R_1—SO_3H$$

and their alkali metal salts, wherein R is selected from the group consisting of hydrogen, acyclic hydrocarbon radicals and cyclic non-heterocyclic hydrocarbon radicals, R_1 is a lower alkylene radical, and Y is selected from the group consisting of lower alkylene, —CSNH—, —CSNH—phenyl—, —CO—, —CS—, and —SO_2—.

16 claims.

No. 2,830,015, 4/8/58—Chromium Plating—L. W. Raymond, assignor to Superior Plating Co., Connecticut.

A porous chromium is claimed by electrolyzing a 150 to 600 g/l CrO_3 bath containing sulfate (1:150 to 1:80) at a c.d. of 12 amp/sq in. on the basis of a c.d. temperature curve shown.

5 claims, 5 figures.

No. 2,830,881, 4/15/58—Treatment of Material—H. Wittrock, assignor to Kaiser Aluminum and Chemical Corp., Oakland, Calif.

To determine the thickness of aluminum and aluminum alloy coatings subject the coated metal to a plurality of immersions of substantially the same period of time in an aqueous acid bath containing hydrogen ions and hydrogen potentially available for ionization and dissociation in amount from 0.2 to 0.9 per cent by weight of solution, copper ions and copper potentially available for ionization and dissociation in amount at least about 0.05 per cent by weight of solution, and fluoride ions and fluorine potentially available for ionization and dissociation in amount from about 5 to 18.2 per cent by weight of solution, said solution having a *p*H not in excess of about 2, said bath dissolving the coating metal at a pre-determined rate per immersion period and providing a loosely adherent deposit of copper on the coating metal and a firmly adherent deposit of copper on exposed ferrous metal, rinsing said coated metal after each immersion to stop the dissolution action by said bath and removing loosely adherent copper deposit formed during each immersion, and continuing said cycle of operations until a firmly adherent copper deposit is provided on said ferrous metal, the uniformity of said coating being determined by the presence simultaneously of loosely adherent and firmly adherent copper deposits and the thickness of said coating being determined for any given area thereof by multiplying the number of immersion periods necessary to form a firmly adherent copper deposit times said predetermined dissolution rate.

9 claims.

No. 2,830,936, 4/15/58—Separating Plutonium Values—A Wehl, assignor to U.S.A. (A.E.C.)

Electrolyze an aqueous solution containing plutonium and 0.1 to 1.0 N in HNO_3 at 1 ma to 1 amp/sq cm at 10 to 60C using metallic electrodes inert to the solution.

1 claim.

No. 2,830,940, 4/15/58—Production of Metals—R. Hood, assignor to Monsanto Chemical Co., St. Louis, Mo.

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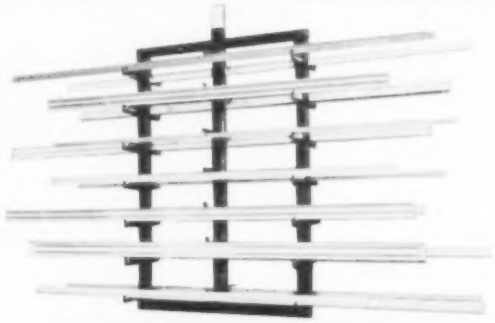

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For dependable and economical anodizing racks and ENGINEERED racks for all types of plating, order today from Davies – largest rack manufacturer west of the Mississippi.

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"A Flexible and Resilient Buff for Flat or Irregular Surfaces"

FORMAX

ZIP-TIP BUFFS

The radial segment construction of the Zip-Tip Buff permits it to perform equally well on flat or contoured surfaces. The cross-cutting movement of the spoke-shaped segments prevent work streaking while it breaks up straight-line patterns on the surface.

- Zip-Tips are available in a wide variety of all cloth constructions —also combinations of cloth and sisal.
- Zip-Tips are made of heavy-duty, bias-cut materials mounted on ventilated steel centers.
- Zip-Tips are extra thick and provide wider buff faces with greater compound retention capacity.
- Zip-Tips are perfectly balanced —require no raking.

Write for Descriptive Literature

FORMAX MFG. CORP.

DETROIT 7, MICHIGAN

"THE FOUR McALEERS"

The deposition of titanium from a molten halide bath is described.

3 claims.

No. 2,830,942, 4/15/58—Electrocleaner for Brass—R. Elliot, Oreland, Pa.

Brass may be cleaned cathodically in a solution containing 5 to 15 parts of glucose, 2 to 10 parts of sodium metasilicate and an amount of caustic soda equivalent to 15 to 25 parts of sodium hydroxide.

16 claims.

No. 2,830,946, 4/15/58—Electroplating Apparatus—W. Pleadwell, Buffalo, N. Y.

Claim 1 states: "In an electroplating apparatus, including a tank for containing an electrolyte, a work basket in said tank for the articles to be plated and pivoted to swing relatively to said tank, about an axis extending lengthwise of said basket approximately midway between the sides thereof, said basket having a bottom formed of two perforate panels extending lengthwise of the same and arranged at a re-entrant angle to each other, the sides of said basket being spaced at a greater distance from said axis than the distance between said axis and said bottom, mechanism for oscillating said work basket about its axis through an arc located mainly below said axis, and an anode arranged above said basket and mounted to swing about a substantially horizontal axis extending substantially parallel to the axis of said work basket, mechanism mounted on said tank for swinging said anode in an arc about another substantially horizontal axis arranged mainly above said axis of said anode.

2 claims, 6 figures.

No. 2,831,803, 4/22/58—Electrodeposition of Alloys—W. Waterman and V. Gripp, assignors to Vandervell Products, Ltd., London, England.

To deposit lead-indium alloys use water-soluble salts of the metals and a controlling agent consisting of water soluble salts of ethylenediaminetetraacetic acid, propylenediaminetetraacetic acid, and cyclohexane-1,2-diaminotetraacetic acid. The improvement consists of using enough hydrazine to minimize oxidation when insoluble anodes are used.

9 claims.

No. 2,831,804, 4/22/58—Improvement of Soils—J. Collopy, assignor to Collopy Electro-Soil Co., Phoenix, Ariz.

Claim 1 states: "A process for stimulating plant growth and increasing crop yield in soils of agricultural quality, comprising the steps of, irrigating the soil with sufficient quantities of water to satisfy the normal demands of the crop planted therein, and cotemporaneously subjecting the root zone of said crop to electro-osmosis, electro-phoresis, and electro-chemical reaction to substantially reduce the content of vegetation harmful sodium salts without materially lessening the calcium content therein by applying a direct current electrical potential between anodes and cathodes thrust into the soil adjacent the opposite borders of an area thereof to be treated, the depth of penetration of said anodes and cathodes being sufficient to cause penetration of said electrical potential at least to the depths of said root zone.

4 claims, 6 figures.

No. 2,831,808, 4/22/58—Rack—G. Esseff, et al, Fort Belvoir, Va.

A rack for supporting articles to be treated in a chemical bath is described.

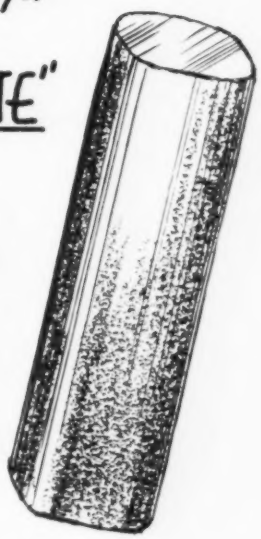
5 claims.

No. 2,831,814, 4/22/58—Pickling Metals—Allan Chester and J. Irwin, assignors to Poor and Co., Chicago, Ill.

To a 6 to 20 per cent sulfuric acid bath add sodium ferrocyanide and sodium thiosulfate, the quantity of thiosulfate being sufficient to liberate 1 to 8 parts of colloidal sulfur 5000 parts of H_2SO_4 and the ferrocyanide being 1.5 to 10 times the thiosulfate.

11 claims.

Here's 9 reasons why the Wise Buyer chooses "PHOSPHOR-BRITE" Rolled COPPER ANODES for ACID BATHS!



1 Uniform color

2 No "bagging" or diaphragms

3 Practically eliminates sludge and copper build-up

4 Smoother and denser deposits with minimum treeing

5 Better anode corrosion than ever before

6 Faster deposition for constant amount of current

7 Reduction in acid replacement and additives

8 Less carbon treatment

9 The bath just lasts longer

Write for details on how you can obtain a test supply sufficient to fill one tank.

UNIVERTICAL
FOUNDRY AND MACHINE COMPANY
14841 Meyers Rd., BRoadway 3-2000, Detroit 27, Mich.

Producers of Rolled — Cast and Forged High Purity Anodes — Nickel — Copper — Zinc — Tin — Lead — Cadmium and Brass.

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INDUSTRY NEWS

Two of Hampshire's key executives and some of the "Striplings" who will represent them during the Summer months. (Standing) Pres. John J. Singer, Robert E. Jensen, Richard A. Drossler and Vice Pres. Alfred A. Lawrence. (Seated) Fred W. Lyons Jr., Charles R. Schroeder and Eugene Kay.

HAMPSHIRE CHEMICAL CORP. FORMED BY DEWEY

Announcement of the formation of the Hampshire Chemical Corp. has been made by Bradley Dewey, chairman of the board. The new company will research, produce and market a new group of chemical specialties, including nickel and copper stripping compounds. The corporation's new plant occupies a 20-acre rail site along the Merrimac River on Route 3 in the southern outskirts of Nashua, N. H.

Dr. John J. Singer of Westboro, Mass. is president. Mark Weisberg of Providence, R. I. is vice president in charge of research, Alfred A. Lawrence of Winchester, Mass., vice president, sales.

Already well under construction, Hampshire Chemical's new home consists of one of the most modern and efficient medium-sized chemical plants in New England. Up-to-the-minute equipment, research facilities, extensive reserve capacity and ample space for expansion give it the production volume already being demanded by a growing list of customers.

Bradley Dewey has been a nationally known figure in industry for many years. He founded Dewey & Almy Chemical Co. and shortly after retiring at the age of 65 founded Bradley Container Corporation which was sold two years ago to American Can Co. He holds several honorary degrees and has been president of the American Chemical Society.

Dr. Singer, in his middle thirties, was formerly president of the United Chemical Corp. of New England in Providence, R. I. He has also been associated with Versenes, Inc., and the Bersworth Chemical Co.

Mark Weisberg, a graduate in chemistry from Tufts College is widely known throughout the chemical world for his chemical product discoveries and process developments. He founded the Alrose Chemical Co. (now a Geigy subsidiary), along with several other successful chemical operations. He has been head of his own research and consulting laboratory in Providence, and was previously active in United Chemical Co. of N. E. with John Singer. He has just completed two terms as chairman of the Rhode Island Section of the American Chemical Society.

Alfred A. Lawrence, who directs Hampshire Chemical's sales and marketing activities, was connected with Dow in sales capacities for about 18 years. For years he has been Dow's Boston and New England sales manager. Mr. Lawrence is well known as an authority on chemical sales, marketing and distribution. He organized and is a past president of the Chemical Club of New England.

B. Dewey J. J. Singer

Hampshire's summer sales force consists of seven college chemistry students who will cover electroplating plants throughout the country to introduce and stimulate the sale of Ni-Plex—Hampshire's stripping bath for removing nickel from basis metals.

Aptly named "Striplings," the seven young men selected are the result of interviewing over 50 interested applicants from the country's leading colleges and universities.

ALLIED RESEARCH RELOCATES CENTRAL SALES OFFICE

J. Albert Cairns, vice president-sales of Allied Research Products, Inc., has announced that the company's Central District sales offices will be located at 400 Midland Avenue, Detroit. These offices were formerly located at 700 E. Atwater Street. L. J. Camill is district sales manager.

NEW GRAVER DEPARTMENT TO HANDLE CHEMICAL PROCESSING

A new chemical process department, formed within the company to handle its expanding program of liquid treatment applications, has been announced by the Graver Water Conditioning Co., 216 West 14th Street, New York 11, N. Y. Noel S. Chamberlin, well-known chemical engineer, has been appointed manager.

N. S. Chamberlin

The new department will be responsible for the application of unit process operations to the processing, purification, separation or recovery of products used and produced by a variety of industries. These unit operations include ion exchange, sedimentation, filtration and flotation.

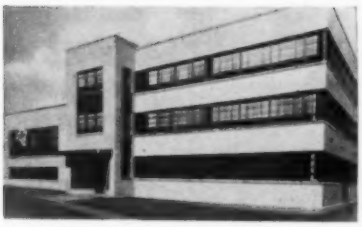
Graver unit operations will be available for any process requiring liquid-solids separation, whether the solids are suspended or dissolved and whether they are organic or inorganic.

Graver's research and development facilities will play a prominent role in the operations of the new department. Research and development are particularly important to chemical processing because of the many applications to which unit operations can be put and also because of the large field which will be served. Since its recent integration with Union Tank Car Company of Chicago, Graver has at its disposal the largest resources in the liquid treatment industry for chemical research and engineering development. In addition, the company has a history of over 50 years successful experience in its field.

Noel S. Chamberlin, who has been selected to head the department, brings to his work a wide and varied background of 27 years experience in the practical and theoretical aspects of chemical processing. He has extensive knowledge of practical plant operation and liquid treatment problems in general. He served for many years as consultant with a leading chemical processing company and also with a prominent consulting engineering firm.

H-VW-M DOUBLES RESEARCH PROGRAM

Hanson-Van Winkle-Munning Co. has more than doubled its investment in re-



search and development during the current recession.

Several key personnel have been added in connection with the continuing expansion program, and further staff additions reportedly are imminent. Included in the program are complete reorganization of the engineering staff, which is now nearing completion, expansion of H-VW-M's electrochemical laboratory and the building and staffing of electrical and mechanical laboratories.

Additional electrochemical laboratory facilities are designed to broaden the company's activities in electroplating and other metal finishing processes, with continued emphasis on nickel-plating processes.

The mechanical laboratory is charged with development of new automatic plating equipment, especially of low-cost, medium- and light-duty types. It is intended also to further the development of automatic load and unload devices, particularly directed to improved coordination with existing automation.

Intensified development of rectifiers and a major move into the field of control engineering are first-priority objectives of the new electrical laboratory. Contemplated in particular are development of rectifier controls and controls for automated plating systems.

OLIN MATHIESON INTEGRATES DIVISIONS

Olin Mathieson Chemical Corp. has completed its integration program which consolidates the company's operating units into seven industrial divisions.

Eleven former divisions have been integrated into four new divisions while the Squibb, Winchester-Western and International divisions continue their present organization structure.

The four new divisions and the vice presidents appointed to head them are: chemicals, Edward Block; metals, Jess E. Williams; packaging, Robert H. Evans; and energy, Carroll Copps.

Mr. Copps joins Olin Mathieson from Atlas Powder Co. where he was senior vice president, a director and a member of the executive committee.

As head of the new chemicals division, Mr. Block will be in charge of industrial, organic, agricultural and phosphate chemicals operations, formerly independent divisions.

Mr. Williams, formerly vice president and general manager of Olin Mathieson's Western Brass division, becomes responsible for all metals activities, including the company's new aluminum fabricating operations.

E. Block J. E. Williams

Russell Hopkinson, who formerly headed the organic chemicals division, has been appointed corporate vice president for commercial development.

CHURCHILL HAS DETROIT SALES OFFICE

The George R. Churchill Co., Inc., Bingham, Mass., has established a Detroit sales office and warehouse to handle the company's line of finger buffs.

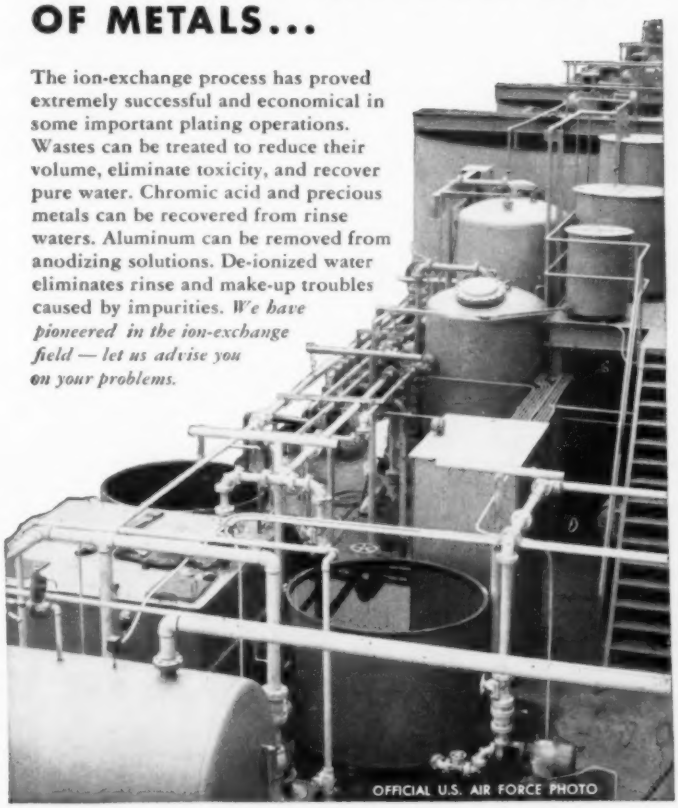
Known as the George R. Churchill Sales Co., the new organization will be managed by James E. Lekander, formerly of Wagner Brothers, Inc. Offices are located at 18055 James Couzens.

ILLINOIS WATER TREATMENT CO.
840 CEDAR ST., ROCKFORD, ILL.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.
NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.

ILLCO-WAY ionXchange

FOR WASTE TREATMENT AND RECOVERY OF METALS...

The ion-exchange process has proved extremely successful and economical in some important plating operations. Wastes can be treated to reduce their volume, eliminate toxicity, and recover pure water. Chromic acid and precious metals can be recovered from rinse waters. Aluminum can be removed from anodizing solutions. De-ionized water eliminates rinse and make-up troubles caused by impurities. *We have pioneered in the ion-exchange field — let us advise you on your problems.*



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 840.

KUSHNER ELECTROPLATING SCHOOL MOVES TO EVANSVILLE

Dr. Joseph B. Kushner, director of the Joseph B. Kushner Electroplating School of Stroudsburg, Pa. announces that effective August 10, 1958, the school will move to new, larger quarters in Evansville, Ind. The new address will be Joseph B. Kushner Electroplating School, 2509 Washington Ave., Evansville, Ind.

Dr. J. B. Kushner

Evansville, approximate geographical population center of the U. S., is conveniently located to the large metal finishing centers of the Midwest, the East and the West and being there will permit the school to give faster mail service to students in all parts of the country.

The school, which has been operating under license from the Pennsylvania Department of Public Instruction for the past ten years, will continue to train and upgrade men and women in the metal finishing industry with its Electroplating Know How Course, by correspondence, from its new Indiana address. The school will also continue to make available his Water and Waste Control and other metal finishing text-manuals, as well as testing instruments and trouble shooting charts for platers. Because of the more convenient location, Dr. Kushner will be available for personal engineering advice and counsel to the industry, on plating and metal finishing problems.

FINISHING PUBLICATIONS NOW METALS AND PLASTICS

Finishing Publications, Inc., has changed its name to Metals and Plastics Publications, Inc. According to Thomas A. Trumbour, general manager, the new name more accurately reflects the scope of today's metal finishing industry.

Metals and Plastics Publications, Inc., was Metal Industry Publishing Co., Inc., from the time it was founded in 1903 until 1947, when the name was changed to Finishing Publications, Inc.

Mr. Trumbour stated that the company's two publications, Metal Finishing and Metal Finishing Guidebook Directory, would continue to pursue the same editorial and advertising objectives. He said no other changes were contemplated at this time.

Metals and Plastics Publications' headquarters is at 381 Broadway, Westwood, N. J., with offices at 35 East Wacker Drive, Chicago 1, Ill., and 219 West Seventh Street, Los Angeles 14, Calif.

ATLAS POWDER HAS NEW TECHNICAL CENTER

Atlas Powder Company dedicated its new Technical Center in a short ceremony on May 25 at the company headquarters in suburban Wilmington, Del. The $3,000,000 facility, located next to the company's general office which was opened three years ago, will house the company's basic research and chemical product development activities.

Atlas President Ralph K. Gottshall told the employes and guests that the Technical Center is essential to the continuing growth of the company. He explained that the company decided to go ahead with its expanded research and development program in spite of the present recession because it was essential to the company's progress.

KENT, BART SUBSIDIARY, MOVES TO NEWARK

F. C. Kent Corp., recently acquired subsidiary of Bart Manufacturing Corp., has moved from Irvington, N. J. to a new larger plant in Newark, adjacent to the parent company's main plant.

Kent is a 45-year-old manufacturer of tube-bending and forming. Bart is engaged in precision electroplating and custom electroforming, and is a leading manufacturer of centrifugal pumps for corrosive services. Bart also electroplates pipe, sheet metal and fitting, and undertakes engineering and research projects in the electroplating field.

Kent's new plant will house its sales and engineering staffs as well as manufacturing facilities.

PENNSALT TO MOVE CORROSION ENGINEERING ACTIVITIES

In anticipation of increased production and sales of its corrosion resistant products for the construction and industrial maintenance markets, Pennsalt Chemicals Corp. will move the sales department and research and development activities of the corrosion engineering department to the Natrona, Pa. plant in September.

Manufacturing, sales and development activities will all be centered in Natrona under the direction of Robert R. Pierce, currently manager of the corrosion engineering department and veteran of 16 years of plant, technical service and sales management.

COURSES IN ELECTROPLATING

City	School	Instructor	Tuition Fee Per Semester	Course Length
British Columbia	—	Walter Kellerman David Titmouse		12 wks.
Brooklyn, N. Y.	Brooklyn Evening Tech. High School	Louis Serota	None	18 wks.
Chicago, Ill.	Illinois Institute of Technology	J. M. Andrus	$80	18 wks.
Cleveland	John Jay High School	S. L. Jackson J. A. Zehnder	$ 6	8 wks.
Detroit	Mumford High School	John Strandburg	$ 5	5 wks.
Indianapolis	Purdue University Extension	Dr. A. M. Max	$45	16 wks.
Los Angeles, Cal.	University of Calif. Extension Division	M. Raskin	$27	18 wk .
New Haven	New Haven College	E. F. Foley, Jr.	$50	15 wks.
Newark	Various Plants and Laboratories	F. J. LaManna	$20	10 wks.
Philadelphia, Pa.	Temple University Tech. Institute	Dr. S. Heiman	$35	16 wks.
Providence: Attleboro	Central Senior High School	Omer Jette J. Fogarty J. Castriotta	None	2 yrs.
St. Joseph Valley	—	Dr. H. J. Wiesner	—	—
St. Louis	Hadley Technical High School	Dr. Otto C. Klein	$ 9	16 wks.
San Antonio	Trinity University	W. P. Wisdom	$10	18 wks.
San Francisco	John O'Connell Tech. H. S.	Horace Smith	—	—
	Palo Alto High Sch. Palo Alto, Cal.	J. A. Pope	—	—
Toronto, Canada	Central Technical High School	A. R. Moores	$15-non-res. $ 5-city res.	24 wks.
Evansville, Ind.	Jos. B. Kushner Electroplating School, 2509 Washington Ave. (Corresp. Course)	Jos. B. Kushner	$150	4 mos. to 1 yr.

The above listings were correct so far as could be ascertained at press time. Possible changes and additions will be published in subsequent issues. Prospective students are urged to verify courses prior to making definite plans.

INDUSTRY NEWS BRIEFS

TITANIUM CHEM MILLED FOR MISSILES

First chemical milling on titanium for missiles was produced recently for the Atlas ICBM by Anadite, Inc., chemical milling firm of South Gate, California.

The parts processed were titanium spheres which were constructed by Rheem Corp. and used to help control propellant flow into the combustion chambers of the Atlas. Convair's Astronautical Division, San Diego, builders of the Atlas, state that the Atlas marks the first major use of titanium for missiles.

ZINC AND LEAD INDUSTRIES PLAN RESEARCH

A major research program is being launched under the direction of the Industry Development Committees of the American Zinc Institute, Inc. and the Lead Industries Association and sponsored by zinc and lead producing companies in the United States, Canada, Mexico, Great Britain, South America and Australia.

The two industries have agreed to establish a research program leading to the creation of "appropriate new knowledge and potential new products and uses aimed at increasing the world wide consumption of zinc and lead."

NORTON CO. LAYS CORNERSTONE FOR NEW PLANT

The cornerstone has been laid for Norton Company's new building at Worcester, Mass. Covering five acres the new building will be for the straight line production of organic bonded grinding wheels.

The unit will cost $6,500,000 when it goes into production next Summer. Installation of Norton designed machinery will not start until September.

LIST OF MISSILE CONTRACTORS AT SBA OFFICES

The Small Business Administration has available for inspection by small firms seeking subcontract opportunities in guided missile production a list of companies holding contracts in this field.

The names and addresses of companies making missile subsystems, components, assemblies, subassemblies and parts, as well as items which make up the missiles, may be seen at any of the Small Business Administration's 53 field offices.

Under this new service of the Small Business Administration every effort will be made to develop subcontract opportunities.

The new program to aid small business is based on a five-part compilation of related information made up of: (1) items in ballistic missiles, guided missiles, rockets, drones and targets; (2) missile assemblies, subassemblies and parts; (3) companies making subsystems, components, assemblies, subassemblies and parts; (4) special requirements in skills, facilities and equipment, and (5) a glossary of terms.

CADMIUM IN 1958 FIRST QUARTER

Cadmium metal production in first quarter 1958 was about 2,440,000 lb, 11 per cent below fourth quarter of 1957, according to the Bureau of Mines, United States Department of the Interior. Production of plating and other salts declined 67 per cent.

Of the total, metal producers' stocks increased 20 per cent, compound producers' stocks went up 18 per cent, and stocks of the 8 largest dealers and producers of plating salts declined 2 per cent.

Brass Plating

●

It is always a hope that by buying some miracle drug we can restore fallen hair, arches and cure all ailments. Platers suffer from the same delusions. There is always a miracle powder which someone is ready to sell as a cure all. In brass plating there is no such cure all. Constant attention to the ingredients and their balance is necessary. The ratios of ingredients are very important. This means that accurate dependable analysis methods are necessary. Additions should be carefully weighed and especially in the case of zinc salts properly dissolved. An analysis is generally advisable after the additions.

●

There is an easier way to do this. True Brite Brass Maintenance Solutions contain no miracle ingredients just the basic materials put together so that additions are balanced. Careful weighing is thus not necessary. Our customers have found that their solutions stay in good condition over quite long periods of time without additions other than True Brite Brass Maintenance Solution.

●

True Brite has developed simple methods of analysis and formulas which will give dependable results and enable correction of troubles easily. Much of what has been written about brass plating is not complete or accurate and our hardest job is to convince new and prospective customers that we have answers which must not be modified. The performance possible with a brass solution in good condition is quite amazing when compared to the commonly used information. It's a big decision to switch over your plating solution but we think you'll be glad you used True Brite Brass Solutions.

TRUE BRITE CHEMICAL PRODUCTS CO.
98 FALLS AVENUE OAKVILLE, CONN.

USE READER SERVICE CARD; INDICATE A 841.

ARTICLE REFERENCES

By
WILLIAM TUCKER
Eastman Kodak
Rochester, N.Y.

Most of the articles listed here may be obtained by writing to the publications in which the articles were published. Addresses are given at the end of the references for the reader's convenience.

Photostat or microfilm copies of articles in available magazines may be obtained from: Library of Congress, Washington, D. C.; New York Public Library, New York; Engineering Societies' Library, New York, at prevailing rates. In other cases, consult Wilson's Union List of Serials at your nearest public library for other sources of these articles.

89. THEORETICAL

a. *UNCOMMON VALENCY IONS AND THE DIFFERENCE EFFECT.*
M. E. Straumanis.
Journal of the Electrochemical Society, May 1958, *105*, No. 5, pp. 284–286.

90. CHROMIUM

a. *EXPERIMENTATION WITH CHEMICAL AND ELECTROCHEMICAL REMOVAL OF CHROMIUM PLATING FROM COPPER.* (*German*).
W. Schlittgen.
Metallwaren-Industrie und Galvanotechnik, *49*, February 1958, pp. 53–57. (Metals Review, May 1958, p. 43).
"Worn Cr plating from Cu printing plates was removed chemically in dilute hydrochloric acid at 50–60C. Removal time decreases with increasing solution temperature. Test for electrolytic removing was performed in sodium hydroxide solution (8 per cent) with and without bagging. Best results were obtained at a current density of 10–15 amp/sq dm. Solution attack on Cu base increases with increasing current density."

91. CONVERSION COATINGS

a. *HOW TO PRODUCE HIGH-QUALITY ZINC CHROMATE COATINGS.*
Joseph Stella.
Products Finishing, June 1958, pp. 32–37.

92. CORROSION

a. *CORROSION RESISTANCE OF FIVE STAINLESS ALLOYS IN NITRIC ACID CONTAINING CHLORIDE.*
I. I. Tingley.
Corrosion, *14*, No. 6, June 1958, pp. 31–32.

b. *INHIBITION OF TITANIUM IN FUMING NITRIC ACID.*
J. B. Rittenhouse and C. A. Papp.
Corrosion, *14*, No. 6, June 1958, pp. 41–42.

c. *CORROSION OF ZINC PLATED STEEL.*
Russell H. Wolff.
Metal Finishing, *56*, No. 6, June 1958, pp. 46–52.

93. MAINTENANCE

a. *"BITUGEL"—NEW ANTI-CORROSIVE BITUMEN COMPOSITION.*
E. A. Duligal.
Corrosion Technology, *5*, No. 5, May 1958, pp. 152–155.

94. MISCELLANEOUS

a. *INSTITUTE OF METAL FINISHING—ANNUAL CONFERENCE, TORQUAY, APRIL 1958.*
Electroplating and Metal Finishing, *11*, No. 5, May 1958, pp. 149–165.

b. *INSTITUTE OF METAL FINISHING HOLDS 1958 CONFERENCE.*
R. Pinner.
Metal Finishing, *56*, No. 6, June 1958, pp. 66–71.

c. *HOW TO PLATE SELECTIVELY WITH A STENCIL MASK.*
Ralph A. Botosan.
Products Finishing, June 1958, pp. 44–47.

d. *DUCTILE STAINLESS WORK HARDENS FOR EXTRA STRENGTH.*
The Iron Age, *181*, No. 22, May 29, 1958, pp. 88–89.

95. NICKEL

a. *MULTILAYER NICKEL COATINGS.*
Metal Progress, *73*, No. 6, June 1958, pp. 95–96.

96. ORGANIC

a. *EPOXIDE RESINS VERSUS CORROSION.*
L. M. Barakan and G. L. E. Wild.
Corrosion Technology, *5*, No. 5, May 1958, pp. 137–140.

b. *PROPERTIES AND APPLICATIONS OF COLD-CURED EPOXY RESIN-BASED COATINGS.*
Corrosion Technology, *5*, No. 5, May 1958, pp. 141–142.

c. *EPOXY RESINS IN CORROSION-RESISTANT APPLICATIONS.*
P. A. Dunn.
Corrosion Technology, *5*, No. 5, May 1958, pp. 143–147.

97. PHOSPHATING

a. *PHOSPHATING TREATMENTS. A COMPREHENSIVE PATENT LITERATURE SURVEY. PART III.*
Metal Finishing, *56*, No. 6, June 1958, pp. 72–75.

98. SILVER

a. *MODERN SILVER PLATING PRACTICE.*
Lawrence Greenspan.
Metal Finishing, *56*, No. 6, June 1958, pp. 61–63.

99. STRESS

a. *FACTORS AFFECTING RESIDUAL STRESS IN ELECTRODEPOSITED METALS. A CRITICAL EVALUATION.*
Joseph B. Kushner.
Metal Finishing, *56*, No. 6, June 1958, pp. 56–60.

100. TESTING

a. *ELECTROMAGNETIC TEST MEASURES EFFECT OF SHOT PEENING.*
P. M. Unterweiser.
The Iron Age, *181*, No. 23, June 5, 1958, pp. 121–123.

101. TIN-NICKEL

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F. A. Lowenheim, W. W. Sellers and F. X. Carlin.
Journal of the Electrochemical Society, *105*, No. 6, June 1958, pp. 338–346.

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a. *PLANNING AND OPERATING AN INDUSTRIAL WASTE DISPOSAL PLANT FOR A NEW PLATING FACILITY.*
G. J. O'Kane.
General Motors Engineering Journal, *5*, No. 1, January-February-March 1958, pp. 8–11.

The following are Metallurgical Abstracts taken from the Journal of the Institute of Metals, March 1958, pp. 526–534.

Accelerated Corrosion-Resistance Tests on Chemically Passivated Electrodeposits of Zinc on Steel. T. Biestek. (Prace Inst. Mech., 1957, 6, (19), 39–54)—(In Polish). B. critically reviews modern techniques of passivation and the testing of coatings. The effects of varying *p*H on chromate passivation are described. The coatings are gelatinous rather than cryst., and have the general compn. $Cr_2O_3.CrO_3xH_2O$. They are water-repellent, compact, and pore-free, and contain Cr^4, which acts as an inhibitor. Their bonding action for paints and lacquers is probably due to inter-particle adhesion. Several mechanisms are suggested for their formation, e.g. reduction of Cr^4 to Cr^3, and adsorption of polar particles from the passivating soln., creating dipolar layers. Accelerated corrosion tests in various media showed that the best resistance is offered by golden-yellow to olive-green films. The best passivating soln. were CrO_3-NaCl and $NaCr_2O_7$-H_2SO_4. 31 ref.

Silver Coatings. (Metal Ind., 1957, 91, (22), 462)—Tough, adherent Ag coatings can be produced on light metals and alloys by the use of ammoniacal Ag soln., as used for mirroring glass. The soln. contains an excess of NH_3 and from 8 to 25 per cent more than the theoretical Ag:$2NH_3$ ratio of 108:34. The coatings have extremely high resistance to atmospheric corrosion, and the process is particularly suitable for coating the internal surfaces of tubes and complex cavities.

Chromium Plating of Aluminum and Its Alloys. T. Zak, J. Erlich and K. Szmid (Prace Inst. Mech., 1956, 5, (17), 7-11)—(In Polish). After pre-cleaning with a soln. of 1:1:8 HF-HNO_3-H_2O at 40C for 30–60 sec., specimens of Al and

its alloys were given an immersion protective coating of brass from a soln. contg. ZnO 90, NaOH 450, CuCN 7.5 g/l. It is possible to determine by electrochem. measurements the point at which the protective coating just dissolves in the Cr-plating bath. If the current is switched on at this point the resultant deposit adheres well to the basis metal. If the current is switched on too soon Cr is deposited on top of the immersion coating, if too late, deposition occurs on the metal which has already been passivated. In both cases the adhesion is poor. The current flowing through a cell formed by a calomel electrode and Zn-plated Al reaches a max., remains const. for some time, then begins to drop, at first rapidly, later more slowly. Extrapolation of the dropping part of the curve, by plotting tangents, supplies a point where two tangents intersect. The time corresponding to this point is the optimum time for switching on the current. The impurities introduced into a Cr-plating vat, when this method is used, amount to only 0.004 g/dm², and are not deleterious.

The Structure of Electrodeposited Alloys. XI. Nickel-Zinc Alloys. E. Raub and F. Elser (Metalloberfläche, 1957, 11, (5), 165–168)—Cf. R and Sautter, ibid, 1956, (A), 10, 65; M.A. 24, 838.

Investigation of the Electrodeposition of a Metal on a Passivated Surface. L. I. Kadaner and A. Kh. Masik (Zhur. Fiz. Khim., 1956, 30, (9), 1983–1989)—(In Russian). The presence of a passivated surface during the electrodeposition of metals improves the grain refinement and adhesion of the deposit. This is probably because, at the beginning of the electrodeposition, the passive film is partly reduced and electrodeposition proceeds at a large number of points. The small grains thus formed coalesce and, having far greater contact area than large grains, produce a deposit which is denser, more compact and fine grained. The areas which are not covered with the deposit still retain the passivated film. K and M based their conclusions on microscopical, X-ray and radioactivity measurements and observations. Various type of deposits and soln. were used in the course of investigations.

Corrosion
National Association of Corrosion Engineers
1061 M & M Bldg.
No. 1 Main St.
Houston 2, Texas

Corrosion Technology
Leonard Hill Technical Group
Stratford House
9 Eden St.
London, N. W. 1
England

Electroplating and Metal Finishing
15 Udney Park Rd.
Teddington, Middlesex
England

Iron Age
Chestnut & 56th St.
Philadelphia 39, Pa.

J. Electrochemical Society
1860 Broadway
New York 23, N. Y.

J. Institute of Metals
17 Belgrave Square
London, S.W. 1, England

Metal Finishing
381 Broadway
Westwood, N. J.

Metalloberflache
Leonhard-Eck-Strasse 7
Munich, Germany

Metal Progress
American Society for Metals
7301 Euclid Avenue
Cleveland 3, Ohio

Prace Instytutow Ministerstwa Hutnictwa Institut Metalurgii
Gliwice
41 K. Miarki 12–14
Poland

Products Finishing
431 Main St.
Cincinnati, Ohio

Zhurnal Fizicheskoi Khimii Akademii Nauk SSSR
Moskva, Shubinskii per., 10
(Moscow, U.S.S.R.)

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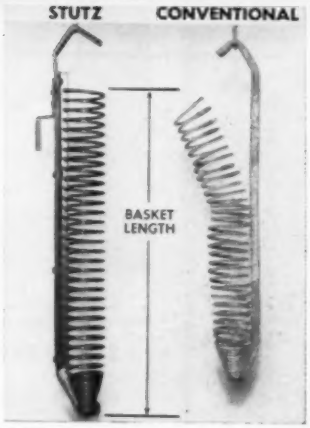

PRICES—11 cents per inch for basket lengths 18 inches or longer. Increments 3 inches. Curved containers one size only, 27″ for 14″ and 16″ diameter barrels 15c per basket additional.

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Illustrated with hundreds of tables, charts, and other helpful material, the book gives needed facts on scores of production processes. Not only are all the common, well-known fabrication methods covered, but you have information on many lesser-known techniques that many times prove to be the answer to tough production problems. Investment casting, stretch forming, powder metallurgy, flame machining and electroforming are a few examples of this latter case.

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PART TWO: Casting
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PART FOUR: Cold Working
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PART SEVEN: Machining
PART EIGHT: Finishing
PART NINE: Electroforming

AMERICAN ELECTROPLATERS' SOCIETY
445 Broad Street, Newark, N. J.

L—801. Barrel Finishing Media—A new folder is available from the Esbec Barrel Finishing Corp. It discusses all types of barrel finishing media including aluminum oxide chips, triangles and spheres, natural chips, novaculite, granite, limestone, and steel media. Detailed size specifications for each type are also given.

L—802. Ion Exchange Regeneration—Ten methods of ion exchange regeneration are discussed in a new technical reprint available from Graver Water Conditioning Co.

The paper, Technical Reprint T-159, points out that no matter what type of demineralizer plant is used, the properly selected regeneration method must provide the right amounts of chemical, proper concentrations and sufficient contact time with exchangers.

The article tells how each of the ten methods works and what controls and equipment are required in each case.

L—803. Paint Stripping—Four methods commonly used by leading industrial plants to remove paint are described in detail in a new booklet recently published by Oakite Products, Inc.

Booklet F7893 first describes twelve different paint stripping compounds—alkaline, solvent, and solvent-acid—each designed to remove different type paints. It then discusses the Oakite Hot-Flow-On method of stripping, consisting of flowing stripping solution through a perforated pipe rake or shower-head. The second method discussed is tank immersion. Third is the steam gun method in which steam is combined with the stripper and flowed on the surface through a steam gun. Brushing is the fourth method: stripper is brushed on, allowed to soak and rinsed off.

The booklet also discusses treatment of metals before repainting, and prevention of rust on stripped surfaces in storage.

L—804. Metal Treating and Finishing—A folder is available from John Swift Chemical Co., Inc. describing metal treating and finishing products. They include acid additives, chemical polishers, brighteners, cutting oils, cleaners, chromate finishes, tumbling compounds, heat treating salts, etc.

L—805. Buffing—The No. 501 Finger Buff is explained in literature made available by Geo. R. Churchill Co., Inc. This buff is used in buffing large irregular shapes without excessive wear on any part of the face.

L—806. Anodes—Data on cast copper anodes is contained in a folder published by Talco Metal Products, Inc. Included is information on flat, oval, wedge (tapered) and long neck type.

L—807. Barrel Plating Equipment—A new 12-page brochure has just been made available by the Udylite Corp. It is profusely illustrated and contains descriptive data on plating barrels, multiple barrel units, replacement cylinders, loading stands, storage and transfer units, rinse units, dryers, silicon and selenium rectifiers.

L—808. Buffing—H. W. Kramer Co., Inc., announces that their new buffing catalog is just off the press.

This catalog covers: Heavy duty buffing lathe, bench model buffing lathe, buffing wheels, buffing hoods, ashing hoods, pedestal hoods, buffing compounds, buffs including chamois and sheepskin.

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L—809. Barrel Finishing—Eight-page, two-color, letterhead-size bulletin No. 158 describes the full line of Lorco equipment for precision barrel finishing. This includes conventional horizontal octagonal barrels in capacities ranging from 0.7 to 36.6 cu ft and the new vibrator in capacities of 12.70 and 17.50 cu ft.

Other equipment described and pictured in the new catalog includes a mechanized screen to separate work and chips or re-grade chip sizes, chip bins, hoist pans, centrifugal dryers, vapor degreasers and a triple-action, tilting polygonal barrel. The new Lord Chemical Corp. booklet also gives information on sample processing and field engineering service that is offered.

L—810. Plastic Processes—The second annual product and processes review issue of its external house organ, The Plastics Weldor and Fabricator, has just been published by the American Agile Corp.

Typical items covered include polyethylene ducting and tubing; tanks in both polyethylene and polyvinyl chloride; exhaust systems including all major components; one of the first polypropylene fabrications; plus dozens of other products and fabrications.

L—811. Liquid Level Controls—The complete line of ECA Liquid Level Controls for universal industrial application is described and illustrated in a new 16-page brochure available from Electronics Corp. of America, Photoswitch Division.

Bulletin PF 571 contains detailed specifications, complete descriptive data, charts and dimensions. A selector guide is presented which will enable quick selection of the appropriate control system for liquid level applications.

L—812. Plastic Steel—Plastic Steel and other Devcon products for the metal working, plastics, and other industries are described in Devcon Corp.'s latest catalog No. NI-103. Besides a complete coverage of the chemical and physical properties of these products, this catalog also contains illustrated case history type applications of plastic steel; Devcon C, the heat-resistant type; Devcon F, the aluminum putty; and Devcon WR, the wear-resistant type.

L—813. Cleaning and Phosphating Material—Development of a new material for simultaneously cleaning and light phosphating of iron, steel or zinc in three simple stages has been announced by Turco Products, Inc. Called Turcoat 4185, the new product is said to assure paint adhesion and prevent rapid re-rusting of steel prior to painting.

Applied by either spray or dip, the new material deposits a smooth phosphate coating of up to 70 ml/sq ft on steel. The coating provided is a phosphate of the metal to which the material is applied, e.g., iron phosphate or zinc phosphate. Detailed literature is available.

L—814. Ultrasonic Cleaners—A new line of ultrasonic cleaners is being marketed by Gulton Industries, Inc.

Produced by the Vibro-Ceramics Division, the new line of industrial cleaners includes six models of bench, floor and self-contained styles, all featuring forced air cooling and varying tank capacities.

Ranging in tank capacities from two to 20 gal, all units operate on 110 v, 60 cycle ac current with the exception of the largest unit which operates on 220 v, 60 cycle ac current. Also, high temperature cleaners are available upon request for special cleaning requirements.

The company has prepared a new 4-page, two-color brochure detailing the complete line of ultrasonic cleaners.

CORRECTION

In the paper "Recent Developments in Gold Alloy Plating" by Dr. Edward A. Parker which appeared in PLATING, June 1958, the word "transistor" should be replaced by "semi-conductor" in the second paragraph, first line under the heading "Doped Alloys" on page 631 and also in the first line under the heading "Indium" on page 632.

Series 105

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PVC TANK LINING

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3. Is it unaffected by strong acids and oxidizing materials?	☐	☐
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EQUIPMENT AND SUPPLIES

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E—801. Belt Grinder-Polisher—The Hammond model UBG-50 is one of a new line of Universal abrasive belt grinder-polisher combinations produced by Hammond Machinery Builders, Inc. The two basic attachments include the U-2 head on the right hand side and the U-1 on the left.

Advantages include more throat depth for awkward shaped parts as well as a small head for flexible belt and internal grinding. A rod grinding and chamfering holder is also available. Can be purchased with or without built-in dust collector and as single or double belt head units.

E—802. Water Dip Lacquer—A new water dip lacquer for silver plated parts, Sealbrite No. 244, for application directly after electroplating or chemical cleaning operations is announced by London Chemical Co. It is said to displace water, protect silver surfaces against oxides, sulfides, discolorations, etc., and enhance solderability of contacts, terminals, lugs, eyelets, printed circuits, etc. It is available in single gallon bottles, 5-gallon cans and 55-gallon drums.

E—803. Platinum Plating—Low cost platinum plating, for high temperature and other exacting industrial applications, has been made available through the development of Platinex III/LS, according to an announcement from Precious Metals Division, Sel-Rex Corp.

It is reported that Platinex produces a pore-free platinum electroplate, in any practical thickness, directly from the bath in one continuous operation.

It produces a fine-grained gray-colored electroplate which is claimed to duplicate exactly the surface of the basis metal. It is said to offer far greater corrosion resistance in high temperature ranges than even rhodium plate, being able to withstand over 2000F indefinitely, with absolutely no evidence of oxidation. According to laboratory reports, the low stress and high ductility features of the process are so pronounced that electroformed sheets can be formed or even crimped without cracking.

E—804. Plating Barrel—Barrel plating of small lots, samples, etc., in a still plating tank is said to be conveniently achieved by a new rack-mounted plating barrel announced by Belke Manufacturing Co.

Mounted on a cathode hook, the barrel plater hangs on the cathode rod of a still plating tank and requires only 6 or 7 in. along the cathode rod.

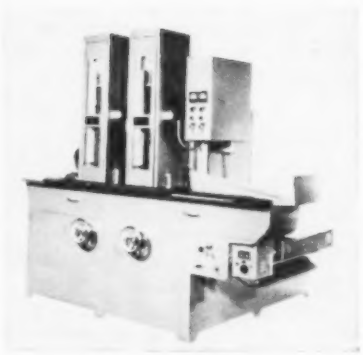
Cylinder and mounting support of plexiglas operates in most any plating solution. In an oblique position the cylinder reportedly plates any quantity from a spoonful to a pint. To unload, the unit is lifted from the tank and the contents poured into a basket or other container.

E—805. Polyethylene Tank—For laboratory or plant use for etching solutions, metal cleaning or other acid service where corrosion is a problem, a 10-gallon polyethylene tank has just been introduced by the American Agile Corp.

The tank is 12 in. wide, 12 in. deep and 18 in. long ID, with a 1 in. top flange.

The four corners have been formed by heat bending, thus eliminating many of the welded joints; only the bottom and one side seam are so joined.

The top flange and the reinforced beading on the side adds to the rigidity of the material and thus it reportedly prevents deformation when the tank is filled with liquid.



E—806. Abrasive Belt Grinder—New precision abrasive belt grinder, the Engelberg Model No. 696, permits two or more high-speed grinding and finishing operations in the same time as formerly required for a single operation. Unmachined surfaces, ground on a series of progressively finer-grit abrasive belts, can be finished to a fine polish to exacting tolerances in one continuous pass.

The new model, available with from two to six or more individually-adjustable grinding heads, offers an extensive capacity range, handling parts up to 5½ in. maximum width and 6½ in. maximum thickness. The machine's conveyor belt, which carries parts under the grinding heads, is powered by a ½ hp variable-speed motor, and is infinitely adjustable for feed rates from zero to 67 ft/min.

E—807. Pedestal Type Unit—The addition of pedestal type units to the company's present line of corrosion-resistant Flex Seal centrifugal pumps, has been announced by Bart Manufacturing Corp.

Capacity range at 3450 rpm; according to the company, is from 10 to 80 gpm against heads to 70 ft. Impellers are self-enclosed.

The company pointed out that solids from 3/16 in. in diameter up to 5/16 in. can be passed through the pumping chamber. Ports are 1 by ¾ and 1 by ½ by 1-¼ in.

Other features in these units are reported to be oversized ball bearings to insure load carrying ability and a locked bearing to prevent the impeller from riding forward and scoring the pump housing.

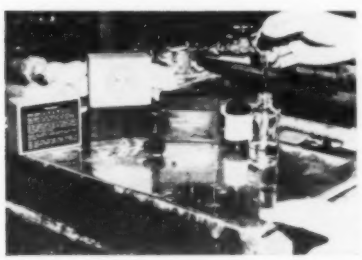
E—808. Buff Treatment—American Buff Co. has introduced a "Golden Treatment" for all types of cotton and sisal buffs manufactured by their firm for operations in the metal finishing industry. Recognized by its golden tinge, it brings three advantages to the trade, according to the company.

By strengthening and binding fibres together, the treatment is said to add firmer body and prevent fraying, particularly on sisal buffs. Sisal cloth which has had this treatment retains buffing compound better, prevents compound waste and makes a more effective buff, it is reported.

More output per hour and longer life per buff are also claimed.

E—809. Cleaner Strength Measure—Strength of cleaner solution can be measured in 30 seconds using the new H-VW-M Cleaner Control Kit according to Hanson-Van Winkle-Munning Co.

Principle is determination of *p*H by titration, but result is calibrated so that the operator reads it directly as number of ounces of cleaner per gallon of solution.



Anyone can make the test on the spot with no further instruction than that provided by brief directions printed on the container. Sensitivity affords sufficient accuracy for all practical purposes.

Kit consists of a clear glass test bottle with a volumetric mark, stoppered with an etched medicine dropper, and a dark glass bottle containing an indicator. Indicator bottle is also stoppered with a medicine dropper.

E—810. Electroless Process. An electroless process for nickel plating magnesium has been developed by The Dow Chemical Co.

The new method involves immersing the metal in a special nickel solution, eliminating the more complex electrode arrangement.

It is expected to prove useful in such applications as electronics equipment, printing cylinders and plates and other surfaces requiring considerable wear resistance.

The new process starts with surface conditioning of the metal by degreasing or other method, followed by chemical etching. Next, the metal is defilmed, then is immersed in the nickel-plating bath for the prescribed period. Each step is followed by a water rinse.

Zinc immersion plus copper strike, a necessary step in the magnesium nickel electroplating process, is used with the electroless process only if maximum corrosion protection is required.

E—811. Buffing Compound Remover—Bufsol, a new, all-soluble buffing compound remover has recently been introduced by J. B. Ford Division, Wyandotte Chemicals Corp. In the illustration, left, buffed die cast handle entered plating department with impacted buffing compound deposits and handling smears. Three minutes in a hot Bufsol bath produced the bright copper and nickel plate at right, according to the manufacturer.

A liquid concentrate used diluted with water, Bufsol contains no solvents to interfere with electrocleaner performance, is said to be readily adaptable to most plating cycles.

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REDLINE

WEARON

TYPE 190

TYPE 160

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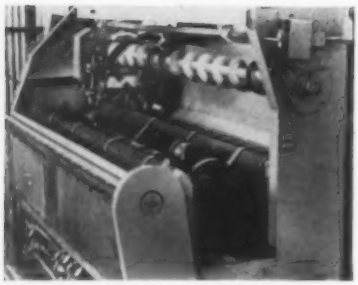


E—812. Shot Peen—Peenamatic model 726, built by Metal Improvement Equipment Co. shot peens any crankshaft up to 16 in. diameter swing and up to 7 ft long, the manufacturer reports. No jigs or fixtures are used because the main journals are lowered directly onto drive belts that both support and rotate the workpiece.

Automatic peening cycle frees operator except for set-up, loading, and unloading. Crankshaft is peened completely by two oscillating nozzles as they travel the length of the crankshaft for one round trip. The nozzle carrier is driven by a helicoid conveyor used as a shot-proof lead screw.

An air wash shot conditioner removes broken shot and dust. The electrical controls conform to NMTBA standards. The cabinet is built of 3/16 in. steel plate on a frame of 3 in. angles.

E—813. Alkaline Cleaner—A new type, alkaline cleaning material for the removal of soils from ferrous metals and copper alloys is announced by the Stratford Chemical Co. The compound is effective for oil and grease removal and is said to be designed to perform these operations with a minimum consumption of active ingredients. No films are left on the work after either cold or warm rinsing. The material operates in recirculating cleaner systems. Operating temperature is 180 F. Steel equipment is adequate.

E—814. Solid Film Lubricant—A resin bonded solid film lubricant, called Surf-Kote H-108, is now available from the Hohman Plating & Manufacturing Co.

It contains a molybdenum disulfide compound that is bonded directly to metal surfaces by a resinous material, forming a solid, dry film of lubrication. This film is said to prevent contact between metal surfaces providing a low coefficient of friction which eliminates galling, seizing, cold welding and fretting corrosion according to reports. The lubricant remains unaffected by humidity or unusual atmospheres, and is imprevious to oils, greases, solvents, acids and alkalis, according to reports. It is easily applied by conventional methods of spraying, dipping or brushing.

E—815.—Plating Rectifier—Design of a new silicon plating rectifier with automatic current density control has been announced by General Electric's Rectifier Dept.

The automatic current density control is claimed to provide precise voltage and current whether one lightly-loaded rack or many fully-loaded racks are being run. Basically, this control is made possible by taking a current signal from the rectifier output and using this signal to adjust the output voltage for compensation on very light loads.

Other new features of this equipment include new Class B glass insulation on reactor and transformer, over-current protection, and new shipment-tested structural strength. Addition of a remote control unit makes possible regulation of automatic current density, constant current, constant voltage, and automatic anodizing.

E—816. Barrel Finishing Machine—Designed with the advantages of higher priced machines at a budget price, a new economy series barrel finishing machine is announced by Almco, Queen Products, Inc.

Designated the Supersheen Model EB-3032, the new model has a 30 in. diameter x 32 in. long barrel for high volume finishing of small parts as well as fast action on large castings and forgings. Total barrel capacity of 13.8 cu ft or 1000 lb can be divided into two compartments.

A variable speed control allows adjustment of barrel rotation speed from 10 to 30 rpm.

A positive magnetic brake and forwarding and reversing switch permit easy positioning of the barrel for loading and unloading. Adequate clearance is provided under the barrel for dumping finished parts directly into pans.

Exclusive features include a roll-away perforated hood, a cam-operated door, and self-aligning bearings with Zerk fittings and expanding dirt-seal rings.

Optional equipment available includes a drain door to permit fast drainage, an unloading boot, and single and dual timer controls.

E—817. Chromate Product—Heatbath Corp. has introduced a new chromate product called Duracoat E-7-P for producing a bright, stain resistant finish for zinc plate. No leach is required and the material is for brightening and passivating zinc plated parts to stand up under conditions encountered in storage or shipping of finished parts. Only 0.5 oz/gal of Duracoat E-7-P, plus a small amount of nitric acid, is required to make up the original solution. Long life and simple control are features of this new product in powder form.

E—818. Reflow Oils—A new process for economical and trouble-free bright flowing of electroplated tin has been announced by Enthone, Inc., a subsidiary of the American Smelting and Refining Co. The process consists of a reflowing oil, Flowbrite No. 1, and an additive, Flowbrite No. 2, for maintenance of the bath at optimum effectiveness.

The Flowbrite bath does not thicken or polymerize with use. Because it is a liquid at room temperature, it does not solidify on cooling and is easy to remove from flowed parts.

The Flowbrite bath is operated at 475 to 550F. Immersing tin plated work in the bath for 5 to 30 sec produces a bright, uniform coating of tin completely free of oxide stains. Because of the low viscosity of the oils, dragout losses are kept to a minimum.

E—819. Fume and Spray Suppressant—Fumetrol, a new fume and spray suppressant for chromium plating solutions is claimed to improve quality and lower the cost of chromium plating according to the manufacturer, Metal & Thermit Corp.

It is said to lower cost of solution replenishment by reducing spray and solution drag-out losses and lower heating cost by enabling platers to reduce air volume removed through tank draft casings.

Available as a low-cost aqueous solution or in pellet form, it is readily soluble in chromium plating baths.

E—820. Aluminum Bright Dip—Conversion Chemical Corp. has announced the development of a new non-fuming bright dip known as Kenvert No. 46-A.

Its advantage is said to be the elimination of corrosive brown nitrogen oxide fumes from the bath and work in transfer. A more stable bath is claimed with an easier to control solution, more stable too for weekend shutdown or when not in use.

Savings result from less acid consumption, reduced expense for exhaust and ducting systems. There is less sludging and reduced pitting.

E—821. Bright Finish Process—A new metal finishing process which produces a bright, lustrous finish on high alloy steels is now available to industry.

Known as Cor-a-brite, it was developed and introduced by Roto-Finish Co. The entire process is completed with one chip mass in one standard barrel finishing machine. This eliminates the necessity to handle parts between several different operations and assures uniformity in appearance and finish of the work pieces, it is reported.

High alloy steel bearings can be processed to produce a bright surface with a microinch reading of 2 rms. When this part comes from the grinders, it has an rms of 10 microinches. In a 10-hour finishing cycle, the microinch reading will be reduced to 2 rms in a single conventional machine with loads up to 350 lb.

E—822. Precious Metals Solution Filter—A rotating magnetic field to drive the pump impeller eliminates the need for any seals or stuffing boxes on the new Pre-Met solution filter introduced by Sel-Rex Corp. This innovation, the manufacturer claims, completely eliminates the possibility of costly solution loss in the filtration of precious metals plating solutions.

The manufacturer states that these low cost filter units are available in capacities up to 800 GPH, by the simple attachment of additional filter tubes. Each tube increases the effective filtration area by 500 square inches. It is reported that flow rate on any capacity unit is easily adjusted from zero to maximum by simple pinch valves, since the canned turbine pump-motor will not overload due to flow restriction, and will use less power as flow diminishes. This feature is also said to permit individual cartridge replacement, without stopping filtering operations, on the multiple tube units.

The new filter utilizes a canned turbine pump and motor unit which is continuously lubricated by the solution being filtered.

Plated under vacuum, these articles have a high-sheen surface that lasts as long as conventionally plated pieces.

Why plating
with vacuum
is easier and more profitable

Without buffing or polishing, without corrosive cleaning baths, without highly skilled help, you can now cover articles like those shown above with a shimmering finish that lasts for years.

All it takes is a CEC vacuum coater and some inexpensive lacquers to make metal and plastic articles look silver, gold, copper, or a multitude of other colors and tones.

Vacuum-plating costs less. With a CEC vacuum coater you can plate thousands of pieces per day with unskilled labor.

New longer-lasting lacquers. There are on the market many lacquers which can make vacuum-plated articles wear as well as those plated in conventional ways.

The stayfast finish requires no retouching, or buffing, or polishing—just an easily applied coat of lacquer.

You can control film thickness easily and precisely. You can make surfaces electrically conductive *or* insulating as you wish.

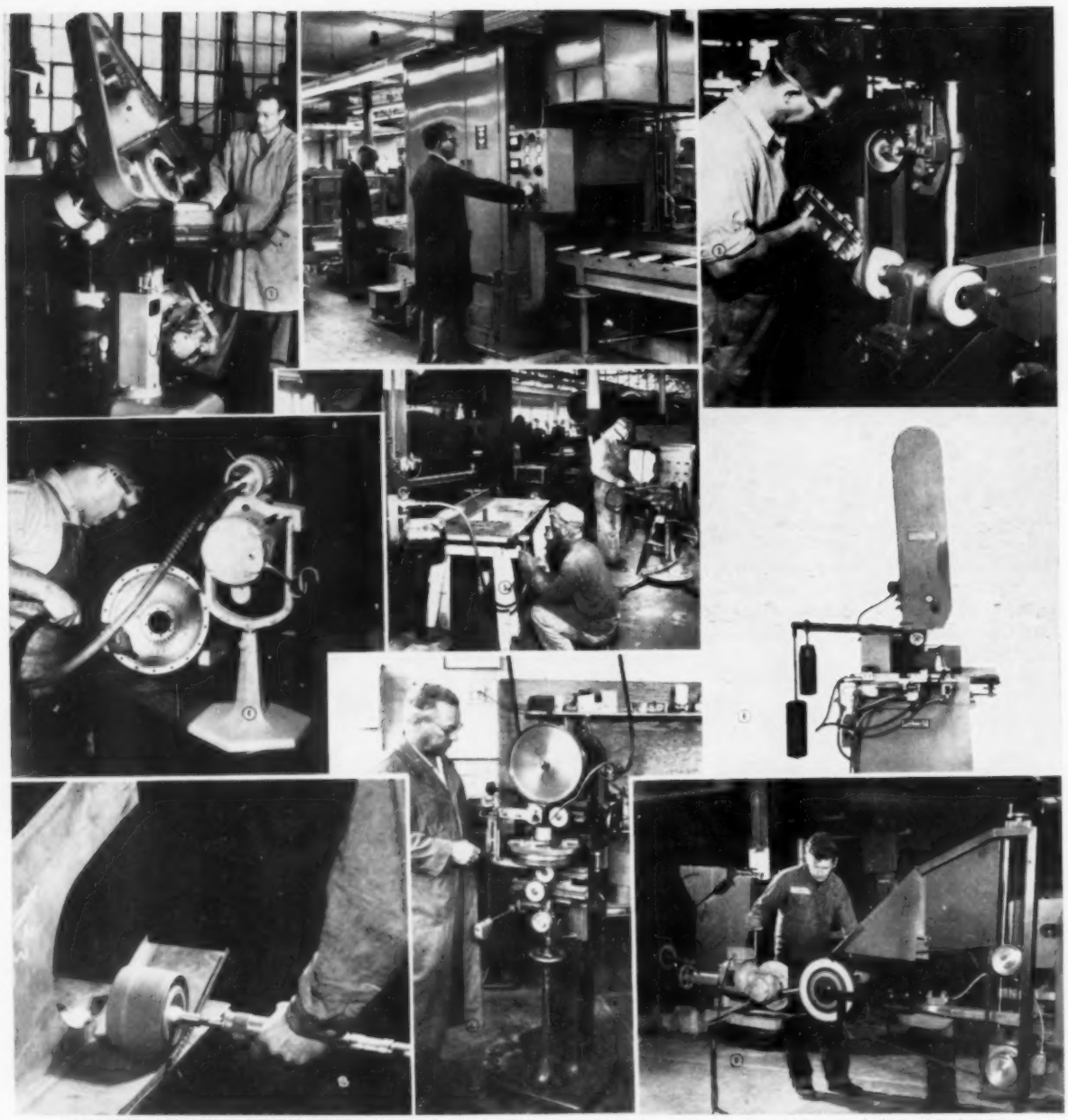
For further information on this highly profitable process, write for information on the coaters, the lacquers, and the methods used.

1450 2½" diameter pieces per cycle, 3 to 6 cycles an hour—that's the production rate of this 48" CEC vacuum coater.

Consolidated Electrodynamics
Rochester Division, Rochester 3, N. Y.

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 848.



COATED ABRASIVE EQUIPMENT. (1) Powered chuck keeps contoured work in contact with coated abrasive belt. (2) 150-hp Hill-Acme grinder uses an abrasive belt 150-in. wide. (3) Bench grinder with vertical and horizontal belts. (4) Operator using a coated abrasive band on a rubber mandrel. (5) Pedestal-mounted flexible shaft machines smoothing weldments on stainless steel sinks. (6) Rise and fall belt grinder for contoured parts. (7) Inflatable rubber wheel allows abrasive band to conform to irregular surfaces. (8) Very narrow abrasive belt for extreme accuracy. (9) Accessory unit converts polishing jack to centerless grinder.

3rd COATED ABRASIVE MACHINERY SHOW

The importance of coated abrasives as a basic industrial tool was greatly in evidence at Troy, N. Y. the week of June 9 when 150 new abrasive machines were viewed and tested by several thousand industrial production men from all parts of the United States and half a dozen foreign countries.

The occasion was the 3rd National Coated Abrasive Machinery Show, sponsored by Behr-Manning Co., a division of Norton Co., at its new $1,000,000 product engineering building. The abrasive manufacturer acted as host to the machinery industry, inviting machine manufacturers to demonstrate developments of the past two years.

Among significant advances in machine tool design, particularly among machines whose weight was measured in tons, was a conspicuous "beefing up" of frames, bearings and drive trains to keep pace with improvements in abrasive belts and with the increasing forces being exerted in heavy stock removal, descaling and similar work. More attention was also paid to flooding the work areas with coolants, and to more thorough filtration to remove grinding swarf and other contaminants from the coolant flow—a benefit where close tolerances must be held in producing low micro-inch finishes.

PERSONALS

Albert Semberski on July 19, 1928 joined The United States Time Corporation and for the past thirty years has been associated with their applied finishes departments.

He served the Waterbury-Middlebury plants as an applied finishes foreman until 1954, when he was assigned to their Little Rock Division. He is general foreman in charge of all applied finishes and chemistry and also serves as technical advisor to other branch plants. He is a member of the AES.

H. W. Kole

A. Semberski

Harry W. Kole has been appointed a district sales manager by Kelite Corp.

Prior to his appointment, Mr. Kole was employed by Fisher Memphis Air Craft, and as a technical service representative for Oakite Products, Inc. He is a member of the American Society of Metals.

Mr. Kole will be responsible for sales in the area formerly comprising Kelite's Miami and Atlanta Districts, and including Alabama, Florida, Georgia, North and South Carolina, and eastern Tennessee. He will have his headquarters at Charlotte, N. C.

James P. Kelleher is newly appointed as manager of sales for Alpha Plastics Inc., Livingston, N. J.

He comes to Alpha from the Alloy Tube Division of Carpenter Steel where he served as assistant manager of product engineering and development. Prior to his affiliation with Carpenter, he was associated with Standard Oil of New Jersey as a process engineer.

An authority on industrial PVC plastic applications, whose articles on the subject have appeared in leading publications in the chemical field, Mr. Kelleher holds a BS and an MS degree in chemical engineering from Newark College of Engineering.

Louis R. Gallas has been appointed sales manager of the Promat Division of Poor & Company in Waukegan, Ill. Mr. Gallas' wide experience in the metal finishing field will complement the expanded effort of Promat to make available its many products and processes to an even greater number of users. He will be instrumental in establishing an enlarged distribution program.

M. A. Tardiff has been appointed manager of general equipment sales for Hanson-Van Winkle-Munning Co.

L. R. Gallas

M. A. Tardiff

The appointment came as part of a group of engineering and sales changes by

Once you use it you'll Order... Again... and Again... and Again!

Every can filled with a full weight of extra high quality 99.75+% Chromic Acid. Prompt delivery made from ample factory and nearby distributor stocks.

PAINTS · PLASTICS · CHEMICALS BFC

BETTER FINISHES & COATINGS, INC.
268 Doremus Avenue, Newark 5, N. J. · 2014 East 15th St., Los Angeles 21, Calif.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 849.

the company. Earlier this year the entire engineering division was reorganized, placing emphasis on research and new product development.

Before joining H-VW-M, Mr. Tardiff was a partner in Vern Bush Co. He has had extensive experience in the plating field. He was head chemist in plating at Keeler Brass, Grand Rapids, for eight years.

He was in charge of the analytical plating laboratory at Winters & Crampton Corp., Grandville, Mich., and before that was employed in the chemical laboratory of Sealed Power Corp., Muskegon, Mich.

Mr. Tardiff was graduated from Hope College, Holland, Mich., with majors in chemistry and mathematics. His previous post with H-VW-M was as general equipment sales engineer for the J. C. Miller Division in Grand Rapids.

J. Justin Basch has been appointed to the new position of marketing vice president of Oakite Products, Inc.

Mr. Basch, formerly vice president for research and product development, will now be responsible for sales, engineering, advertising and marketing research as well.

A graduate of Massachusetts Institute of Technology, Mr. Basch, who joined Oakite in 1925, was for many years Philadelphia division manager of the firm. He was elected to the board of directors in 1948 and became vice president in 1956. He has been responsible for product development since 1953.

J. J. Basch

H. L. Wright

Howard L. Wright has been named as manager of Hanson-Van Winkle-Munning Co.'s new Special Products Sales.

Establishment of the new sales section under Mr. Wright's direction is intended to develop new markets for the company, especially in the field of electrical and mechanical products.

He has been with H-VW-M for 11 years, serving as district manager for the company in the Middle Atlantic States area.

A graduate of Franklin & Marshall College, he served in the U. S. Navy during World War II.

Jacob G. Schirtzinger has been promoted to district sales manager by Kelite Corp.

Mr. Schirtzinger has been employed by Kelite as a sales engineer for the past five years. In 1956 and 1957, he was a member of the Key Club, an honorary group composed of Kelite Sales Engineers who annually produce the top sales volume for the Company. He is a member of the American Electroplaters' Society.

Mr. Schirtzinger will be responsible for Kelite sales in Ohio. He will make his headquarters at Dayton, O.

Pete Petroff has been appointed sales representative in Western Ohio, Southern Indiana and Northern Kentucky of Heatbath Corp.

Mr. Petroff is a graduate of Ohio State University and was formerly associated with the Bison Corp. He will handle Heatbath's complete line and will have headquarters in Columbus, Ohio.

Heatbath also announces the transfer of **Jim Wheeler** to the Chicago district where he will assume new sales duties. Mr. Wheeler will continue to supervise sales in the area covered by Mr. Petroff as well as in the Cleveland area.

Albert P. Shutts, assistant sales manager since January 1957, has been promoted to sales manager of Becco Chemical Division, Food Machinery and Chemical Corp., Buffalo, N. Y.

A graduate of Rutgers University, Mr. Shutts joined Becco in 1946 as a sales representative in the New York territory and in November 1955, was appointed manager of the territory. In January 1957, he was transferred to Buffalo.

C. Heamon Castle has been named as technical director of Abrado Finish Corp., Grand Rapids, Mich. Mr. Castle holds

Cuneo Press finds "Plus-4" Copper Anodes keep working until they're "so thin that they almost float"

In the big, busy rotogravure cylinder plating room of The Cuneo Press, Inc., Chicago, the acid-copper tanks are operating 24 hours a day.

Supplying precision cylinders to meet weekly deadlines in printing some 13 million copies of weekly magazines and pictorial sections for newspapers calls for maximum reliability and efficiency in every phase of the operation.

Late in 1954, Cuneo first tried "Plus-4" Anodes, Anaconda's phosphorized copper anodes. After more than three years of experience, they report the following advantages:

1. Solution is more easily maintained and balanced—with considerable saving in solution dumped and acid added.

2. Practically no sludge—tanks are drained only half as often as with ordinary anodes.

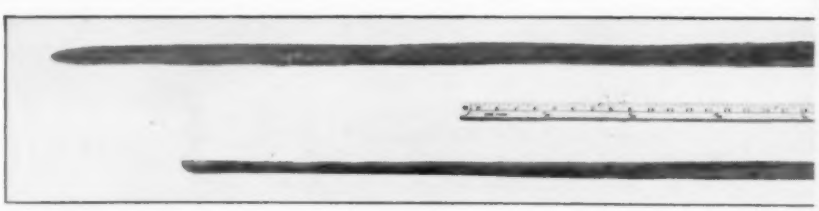
3. 15 per cent more usable copper. "Plus-4's" corrode so evenly (see below) that only slender ribbons remain. Though these do not actually float, they become so light that they no longer maintain proper contact with the anode cradle.

Write for information on how you can obtain a test quantity to supply one tank. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 58137

ANACONDA®

"PLUS-4"® ANODES Phosphorized Copper

MADE BY THE AMERICAN BRASS COMPANY



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 850.

C. H. Castle

F. J. French

a degree in metallurgical engineering from Michigan College of Mines and Technology where he graduated in 1933. He formerly was technical director and vice president of Roto-Finish of Kalamazoo, Mich., where he worked for 14 years. He has devoted the past 25 years primarily in the barrel finishing field, holding several patents on methods and processes for barrel finishing. He is the author of articles on barrel finishing.

Frank J. French has been named vice president of Allied Chemical's General Chemical Division.

Mr. French will be in charge of the Division's production, mining, purchasing and industrial service activities. A veteran of 29 years with the company, he has been director of purchases since 1952.

He began his career with General Chemical as a control chemist at the company's Hudson River works in Edgewater, N.J. From 1932 to 1945 he held various technical positions at the Division's Laurel Hill, N. Y. research laboratory and at its Delaware Works, Marcus Hook, Pa.

In 1949 Mr. French was appointed general superintendent of its Baker & Adamson works. In 1952 he returned to the New York Office as director of purchases, the position which he has held until his present appointment.

He is a graduate of Lehigh University where he received a BS degree in chemical engineering in 1932.

Carl R. Gloskey, research manager at Metal & Thermit's laboratories, Rahway, N. J., has been awarded a Sloan Fellowship for advanced work at the School of Industrial Management of the Massachusetts Institute of Technology.

This is one of 37 such fellowships awarded this year to young executives who will spend twelve months at the Institute in detailed studies of the fundamentals of sound management.

Putting finishing touches on a copper cylinder for one of the weekly newspaper rotogravure sections shown in the background. *Below:* Typical "fish" from Cuneo's tanks. The top one is 80" long, weighs 2 lb. 3 oz.—original 85-lb. anode was 1" x 3" x 88½". Lower "fish" is 71" long, weighs 1 lb. 4 oz.—original 74-lb. anode was 1" x 3" x 76".

PHILIP N. ENGEL

Philip N. Engel, chairman of the board of directors of Infilco Inc., suffered a heart attack in his office on Tuesday, May 20, and died at the Tucson Medical Center on May 26.

Mr. Engel had been president of the company from 1905, when he succeeded his father, until he became chairman of the board in 1957.

He acquired his technical training at the Armour Institute of Technology. When he joined his father's small company, The International Filter Co., he immediately inaugurated a research and development department and hired one of his own teachers at Armour to manage it.

Mr. Engel's long association with the water industry had earned for him the admiration of all who knew him, and an honorary life membership in the American Waterworks Association. He is survived by his widow, a daughter and two grandsons.

SIGMUND FABRY

Sigmund Fabry, mechanical engineer with Belke Manufacturing Co. for 31 years and widely known throughout the plating industry, died June 18 in his home at 5420 Virginia Ave., Chicago. He leaves his widow, a son, a daughter, four grandchildren, and two brothers.

BRANCH NEWS

Total AES Branches U. S., Canada Australia, August 1, 1958—58.

BLUE RIDGE

Branch Bylaws Approved; Haupt Discusses *p*H

The Blue Ridge Branch of the AES met on June 6 at the S. and W. Cafeteria, in Roanoke, Virginia. After dinner, President **T. H. Boggess** called a business session to order. The bylaws, submitted by a committee composed of **Carl A. Witherspoon, Bruce E. Wallace, Paul D. Callahan** and **N. F. Murphy** were discussed and approved unanimously. They will now be sent to Headquarters for approval.

Dr. N. F. Murphy reported on actions taken at the Cincinnati convention, at the business session and the Branch Secretaries' meeting. The Branch approved purchase of Golden Anniversary stationery and such other supplies as the Branch secretary required.

By vote of members present, the July and August meetings were dispensed with, and plans made for a September, outdoor picnic supper meeting to be held in Blacksburg, Virginia.

The members voted to retain their present officers for the coming year since they had served only part of a full year. The officers for 1958–59 will be: T. R. Boggess, president; N. F. Murphy, 1st vice president; Bruce E. Wallace, 2nd vice president; Carl A. Witherspoon, secretary-treasurer, and P. D. Callahan, librarian.

C. G. Haupt, chemist for the Norfolk and Western Railroad discussed measurement of *p*H. His talk was so interesting that he was invited to continue his demonstration-lecture in the fall.

Carl Witherspoon
Secretary

BRITISH COLUMBIA

Sample Delivers Paper; Airlines Tour Postponed

The meeting of the British Columbia Branch was held June 13, at the White Spot Dining Room, Vancouver, B.C. with an attendance of 13.

It was moved by **Walter Kellerman** that the cost of executive meetings, lunches, etc., should be paid by the Branch treasury. The motion was seconded by **Ralph Wolloschuk** and carried. One new member was elected.

A report on the proposed visit to C.P. Airlines and the tour of the Bristol Britannia was read by Secretary **Nelson Shepherd.** The situation at this time was that due to a very tight operational and maintenance schedule C.P. Airlines were not prepared to allow this tour until the fall of this year.

Following the business session, **Clarence H. Sample,** of the International Nickel Co. was introduced by President **Jim Lee.**

Mr. Sample delivered an extremely interesting and informative report on work that he has been involved in, concerning the evaluation of electro deposited nickel from a corrosion resistance point of view. He compared standard dull nickel solutions with those of the bright nickel type, and explained the effect of variations in subsequent chromium plates and copper undercoats. He illustrated his talk with colored slides showing their corrosion testing systems. An active question and answer period followed.

Nelson A. Shepherd
Secretary

CAPITOL DISTRICT

Sonnenfeldt on European Plating; Clambake on August 23

The Capitol District Branch met on Monday evening, June 2, at the Hot Shoppes Restaurant, Route 9 just north of Albany, N. Y. The membership report included the resignations of **Fritz Schweitzer,** outgoing treasurer, who, due to his new work schedule, will not be able to attend the meetings, and **Charles Schenk** whose new position is out of the metal finishing field. Literature was received from the Joint Engineering Society requesting our participation in the Fall meeting and smoker. Secretary **Allison** will get more information on this proposed meeting and send out a questionnaire to all members.

A clambake *will* be held August 23 at Endries just north of Schenectady on Route 50 commencing at 11 a.m.

The new officers for the coming year were installed by **Chet Klimek.** The new officers are: President, **John Green;** 1st vice-president, **Robert Hill;** 2nd vice-president, **Zygamund Nash;** secretary, William R. Allison; treasurer, **Michael Guarneri;** librarian, **Ed Frieberg.** The Board of Managers for the coming year will be **Ray Dunlevy, Robert Wolf** and **Art Eisner.**

René Sonnenfeldt of Sel-Rex Corporation talked on "Plating Practices in Europe and the United States". Mr. Sonnenfeldt's comparison of the electroplating practices, formulations, chemical supplies and personnel abroad and here in the United States formed a most enjoyable and informative educational session. Mr. Sonnenfeldt also related many of his own experiences in Europe before coming to this country three years ago.

John H. Green
Corresponding Secretary

CHICAGO

To Meet First Friday; Pettit is Speaker

The regular June meeting of the Chicago Branch was held Friday, June 6, at the Western Society of Engineers. President **R. Scott Modjeska** announced that future meetings of the branch will be held on the first Friday of each month at the above mentioned site.

Ten applications for membership were submitted by Secretary-Treasurer **Paul Glab** and were unanimously approved. The new members were introduced to the other members.

The meeting was turned over to Librarian **Joseph Corre,** who introduced the speaker of the evening, **Ralph Pettit** of the Diversey Corporation. Mr. Pettit is a graduate in chemistry from the University of Chicago and worked with Alcoa for a number of years in sales and development divisions. He also worked for a leading name plate manufacturer in Chicago and is now employed as a technical advisor in the metals industry department of the Diversey Corporation.

Mr. Pettit spoke on the "Manufacture of Etched Goods and Escutcheons." He started with a short history of etching when the parts were (1) dipped in beeswax (2) blackened with a lighted tallow candle (3) the design was then sketched on the blackened surface (4) the wax was cut through to expose bare metal (5) followed by proper chemical treatment to etch away the metal. He illustrated the various processes in the manufacture of etched goods with the use of colored slides. The process briefly consists in the preparing (1) of an oversize drawing of the name plate (2) photographing to actual size (3) a press-plate made from the glass negative (4) plates are then lithographed, treated with asphaltum powder and then fused in a muffle furnace (5) proper etchant applied followed by spraying with enamel (6) solvent dipped, to soften the enamel, and then scrubbed to remove raised portions of enamel from plate (6) machining of plates into strips and then to punch press department to place the holes in the plate (7) then to the inspection department and finally to the shipping department.

At the conclusion of his talk, Mr. Pettit passed to the audience some samples of aluminum anodized sheets to which reproduction of paintings in multi-colored inks were applied. His talk was well received as evidenced by the many questions brought forth by the members present.

Christopher Marzano
Publicity Chairman

CINCINNATI

Annual Picnic Success Despite Wet Weather

The Picnic Committee did it again. Seventy members and guests braved the "elements" to attend the Annual Picnic on June 21, at Sharon Woods. **Bob Rarick** and **Bob Pendleton** used their night vision to emerge victorious in the Horseshoe Tournament. The matches started during the intermittent showers in the late afternoon and finished just after dark. The annual ball game between the platers and suppliers did not start until early evening on a very wet field. There seems to be a difference of opinion concerning the outcome of the game. It is claimed that both the platers, captained by **Ralph Mustain,** and the suppliers, captained by **Stew Chipman,** were victorious. The only point of agreement is that there were many runs scored and everybody had a good time.

The committee consisting of **Earl Leonhardt,** chairman, and **Al Jacobs** did a terrific job in setting up and executing the festivities.

David L. Kaplan
Secretary

DETROIT

Committee Chairmen Appointed; McAleer and Pinner Report

Manuel Ben, president of the Detroit Branch called an Executive Group meeting which was held on June 5.

President Ben announced the appointment as committee chairmen the following: Public Relations, **R. C. Trees;** Stag Day 1959, **J. B. Hitchcock;** Long Range Planning, **C. F. Nixon;** Detroit Nuclear Council, **C. O. Durbin;** Plating Lecture Course, **E. L. Scholl.**

Of immediate interest was the report by Mr. Hitchcock that the annual Stag Day event will be held at the Hillcrest Country Club in Detroit on July 26. This annual Detroit event is without a doubt the largest AES stag gathering in the country.

Howard McAleer, general chairman of the 1959 Industrial Finishing Exposition, reported 57 per cent of the space sold with 18 new exhibitors signed.

Walter Pinner, chairman of the Educational Program of the 1959 convention, reported that he has 29 papers assured and all of a quality to guarantee the finest educational program ever presented to the organization.

Herberth Head, our AES national president, commented on the Cincinnati convention and complimented those who were in charge on its smooth working and excellent management.

There were several other committee reports on activities which will be more fully developed later and reported on at that time.

R. C. Trees
Publicity Chairman

LOS ANGELES

Winters Speaks on Anodes

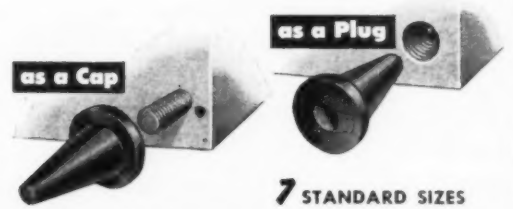
President **Norman McEwan** welcomed a large group of platers and guests to the May 14 meeting. The business session was one of the liveliest we have had. With discussions on method of nominating and electing officers as the main theme. After the secretary got writers cramp trying to keep up with all that was said, a committee was set up to investigate and report to the members at the next meeting.

Five new members were inducted.

Jack B. Winters of Incar presented "The Anodes' Side of the Story". This was very interesting and was well presented. It was well received by the members who made many complimentary

For Metal Finishers!

Pressure Moulded NEOPRENE "CAPLUGS"



7 STANDARD SIZES

	A	B	C	D	E	F	G
TO PLUG HOLE SIZE	1/8-3/16	3/16-1/4	1/4-5/16	5/16-1/2	1/2-5/8	9/16-11/16	5/8-3/4
TO CAP STUD SIZE	3/32-5/32	5/32-3/16	3/16-1/4	1/4-5/16	5/16-3/8	3/8-7/16	5/16-1/2

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DUGGAN Masking Devices

Sethco Epoxy Filter Chamber DEFIES Chemical Attack & Heat! ...up to 220° F

dynel filter tubes, stainless steel center rod, self-priming SS 316 pump

trouble-free DEPTH FILTRATION for problem solutions

Sethco FILTER PUMP UNITS

MODEL ASIN-400

No more difficult hard-to-handle solutions. Hot, highly concentrated acids or alkalies filter fast and clear through these specially designed Sethco Filters. Non-porous, heavy duty construction and automatic reversal for self-washing. Portable, low cost operation.

Over 25 other models—50 to 3000 gals./hr.

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TECHNICAL PROCEEDINGS AVAILABLE FOR YOUR ORDER

DEMAND, internationally, for copies of the recently published 1957 Edition of the AES's book, TECHNICAL PROCEEDINGS, is gaining momentum. Hence, the Society's limited remaining supply is fast diminishing.

Containing each of the technical papers delivered before the AES's 44th Annual Convention held in Montreal, Canada, June 17-20, 1957, together with their charts, diagrams, graphs, tables and other illustrations, and with the verbatim discussion that followed their delivery, TECHNICAL PROCEEDINGS broadly enriches technical and scientific knowledge in the field of electroplating, metal finishing and allied arts.

Orders for copies will be accepted and serviced by the American Electroplaters' Society on strictly a first come, first served basis so long as its limited supply lasts.

The domestic cost of the book is $10 per copy including postage. To those ordering it from outside the United States' continental limits, the charge is $12 per copy including postage cost. All orders must be accompanied by payment in full so as to obviate unnecessary bookkeeping expense. Address orders to:

AMERICAN ELECTROPLATERS' SOCIETY

445 BROAD STREET, NEWARK 2, N. J.

A very limited quantity also exists of the 1956 Edition. Domestic price is $12.50 per copy; foreign $15 per copy. All orders must be accompanied by payment in full.

remarks. Mr. Winters has the unusual ability to discuss a complex subject in simple understandable terms.

Don Baudrand
Secretary

LOS ANGELES
Sample Discusses Decorative Plating

Clarence H. Sample addressed a large group of interested platers at the Los Angeles Branch on June 11. His topic was "Recent Developments In Decorative Plating." He had some very interesting slides showing comparative corrosion of various nickel, nickel-chromium, and copper-nickel-chromium systems.

Truman Stoner reported on the convention at Cincinnati. Truman also urged support of the 1959 convention to be held in Detroit. And of course the 1960 convention in Los Angeles.

A new member was initiated into the society.

Don Baudrand
Secretary

MONTREAL
Hanna on Bright Nickel; May Change Meeting Night

The regular monthly meeting was held at the Mount Royal Hotel on June 2. Twenty-five members were present.

D. Hanna gave a very interesting talk on the most recent developments on bright nickel plating. After a short intermission the regular monthly business was discussed. **P. M. Coady** was appointed to chair a committee to lay out a course to be held locally on electroplating. He will report at the next meeting. It was also suggested that a questionnaire be sent out to the members to find out if they would like to change the present meeting night, which is the first Monday of the month, to the second Monday of the month.

R. W. Niggemann
Secretary-Treasurer

NEWARK
Visit to International Nickel Research Laboratory

The June 20 meeting of the Newark Branch was held at the Research Laboratory of the International Nickel Co. in Bayonne. About 70 members and friends, including National Second Vice President **Wesley,** and National Executive Secretary **Nichols,** toured the laboratory, after which Dr. W. A. Wesley, manager of the Laboratory, welcomed the group on behalf of International Nickel.

President **Gus Bittrich** opened the business meeting; as the first order of the business nine new members were elected, bring the total Newark membership to 351.

Dr. Wesley then reported on the

NEWARK BRANCH MEETING AT INCO RESEARCH LABORATORY—(Left) The Branch members hear a paper presented by Dr. B. B. Knapp. (Center) Enjoying refreshments after the laboratory tour. (Right) Members inspecting the Inco automatic plating machine and holding group discussions.

Cincinnati Convention pointing out that Newark had obtained the 1963 Convention after which Gus Bittrich stated that Andy was elected second vice president. Secretary **Foulke** was instructed to cast a ballot electing the following delegates: W. A. Wesley, **George Wagner** and Don Foulke, and alternates: **Gerald Lux, Cy LaManna, William Grigat.**

Andre Ziegler of Zurich, Switzerland, representing Werner Fluhmann Galvanische Anstalt, was introduced.

Dr. Petrocelli introduced **Dr. Burt Knapp** as the speaker of the evening who discussed "The Effect of Interposed Layers of a Second Metal on the Weather Resistors of Electrodeposited Nickel Coatings". Composite nickel coatings with certain metals show excellent promise as a means of prolonging the life of a decorative nickel-chromium finish. Extensive exposure tests in seacoast and industrial atmospheres have indicated that an interposed layer of these metals between nickel layers can give corrosion resistance up to the equivalent of that given by twice the total thickness of nickel alone. The improved weathering resistance is believed to be due to the galvanic action between the metals and the interruption of the columnar grain growth of dull nickel.

The paper describes exposure tests that were made on the composite coatings as foils and as a coating on steel. The variations in the intermediate layer which were studied included composition and thickness. Chromium was found to be the most effective metal in the composite. Tests were made with both buffed dull nickel and bright nickel.

Opportunity to Authors

Member or non-member authors of technical and scientific papers on electroplating, metal finishing and related arts are cordially invited to submit manuscripts of original, unpublished papers to the Editor of PLATING for review and publishing consideration.

Any such paper accepted and published in PLATING will also be eligible, of course, for selection by the Society's Paper Awards Committee for the Carl E. Heussner Award; AES Silver Medal; AES Bronze Medal; George B. Hogaboom Memorial Award; Robert S. Leather Mechanical Finishing Award; Chromium Plating Award; Precious Metal Plating Award, or the John J. Hanney Memorial Award.

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The broad interest in the tour (demonstrating the testing, development and research carried out on nickel) and the talk (indicating corrosion resistance of nickel can be improved over and above the accepted criteria) was shown in the relatively large June turn-out including long-time member, **Sam Taylor,** president of Newark Branch in 1934, 1935 and 1936, **Fred Lowenheim** and newly initiated **Peter Barth** of Ideal Plating, who represents a cross section of members of the Branch.

The very successful meeting concluded with sandwiches, dessert and coffee, all of which made for a very successful meeting.

D. Gardner Foulke
Secretary

SEATTLE-PUGET SOUND
Nelson Talks on Effects of Chromium

The Seattle-Puget Sound group held the last meeting of the spring season on June 3 at the College Club, Seattle. Only 20 members were present to see the outgoing chairman give the new officers AES buttons. The new chairman in turn presented the past presidents with AES buttons.

Forest Bradford, one of the delegates to the convention, gave a brief report on the convention activities.

The speaker for the evening was **Philip Nelson** of Boeing Airplane Company who gave a very interesting discussion on "Harmful Effects of Chromium on the Physical Properties of the Basis Metal."

The members of the Seattle-Puget Sound group extend best wishes for the summer vacation period and hope anyone visiting the Pacific Northwest will be able to contact local members or officers for points of interest.

The big Seafair celebration from Aug. 1 through 10 is a high point of the summer and the Gold Cup hydroplane races on August 10. Good Summer vacation!

Helen Archibald
Secretary

SOUTHERN TIER
Ansco Plant Tour; Sonnenfeldt is Speaker

The June meeting was our final for the current year and was combined with a special plant tour.

About 34 members and guests were taken through the Ansco Div. of General-Aniline and Film Corp. plant in Binghamton, N. Y. Object of the tour was to see actual processing and manufacturing of photographic film. Beginning with the basic emulsions we saw how the film was made and concluded in seeing the final stages of processing which envolved the packaging of the finished product.

The dinner and meeting for the evening were held in the Carlton Hotel, Binghamton, N.Y. Opening remarks by Mr. **Stefanski** included our appreciation to member **Charles Bound** and officials at Ansco for a wonderful plant tour.

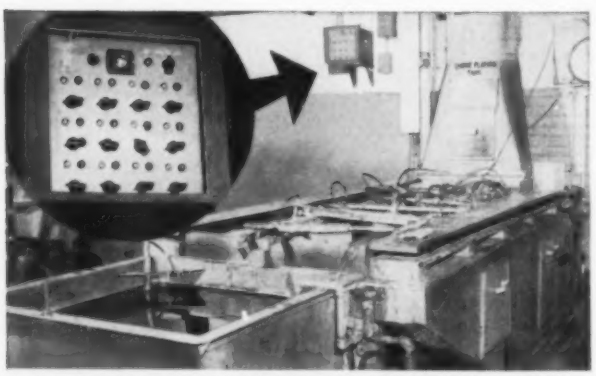
Comments on the success of the National Convention in Cincinnati, Ohio were given by those members who attended.

A report on the summer annual picnic to be held Aug. 23, 1958, was given by chairman **J. Bunsic.**

Librarian **Charles Emery** introduced the evenings speaker, **René Sonnenfeldt,** representing the Sel-Rex Corp. His topic for the evening being "Precious Metal Plating in the Industry" Mr. Sonnenfeldt spoke of the applications of silver plating, including aircraft engine bearings, lining chemical storage tanks, plating of stainless steel for welding surface of jet parts. Gold is being plated on printed circuits, gyroscope parts and plated parts in the satellites and missiles. Advantages of this metal are tarnishing and oxidizing resistance, also better wear resistance.

Platinum is being used extensively in nuclear industry and as catalysts in oil refining. Rhodium is used where a high temperature is required.

B. Rossiter
Secretary



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SPRINGFIELD
Golf Outing and Banquet

The Springfield Branch combined the final meeting and installation of officers with the second annual golf outing and banquet, which was held at the Whippernon Club, Russell Mass., on Saturday, June 14. Tee-off time was one o'clock for the golfers and the horse shoe tossers.

At seven o'clock, the scores were figured, and showed the winner to be **Elery C. Gibson.** Besides the winner's prize, "Gibby" was presented the "Colin Hastie Memorial Trophy" as having the lowest gross score.

After a fine roast beef dinner, **Mel Roske** took over as the Installation Officer. The following were installed for the coming season: President **Edward F. Koetsch Jr.;** 1st Vice President **Elery C. Gibson;** 2nd Vice President **Raymond Howe;** Secretary **Henry L. Heissfeld;** Treasurer **George H. Mongeau;** Librarian **Alexander R. Salmond;** Historian **John E. Costigan. Ernest E. Couture** is to uphold the post of research and finance chairman. The new Board of Managers consists of: **Melvin P. Roske, Martin J. Murray, Louis E. Dupuis, Charles F. Griffin Jr.,** and **Joseph F. Mitchell.**

The Activities Committee which had planned this successful event was spark-plugged by Mel Roske, and ably supported by Al Salmond, Marty Murray, **Roger Heroux, Wayne Sanders** and Elery Gibson. Outgoing President Charles F. Griffin Jr. thanked the committee for a wonderful job and thanked the Executive Board for its cooperation during his term of office.

The balance of the evening was spent in social activities.

Henry L. Heissfeld
Secretary

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Except June, July, August

AES MEMBERSHIP REPORT

ELECTIONS

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Bridgeport: C. J. Ciesluk, G. A. Lewis, H. Miller
Central Michigan: W. J. Harrison
Chicago: A. Alexander, D. W. Brown, D. S. Burnette, W. M. Davis, H. J. Harrast, W. A. Mercer, D. P. Phillips, R. J. Vanderplow, J. J. Trutty
Los Angeles: L. K. Bjeiland, J. B. Blackburn, L. J. Lundt, R. D. Martin, A. S. Stock, C. Troncale
Newark: H. P. Abaire, J. Allen, P. E. Barth, G. L. Bastory, C. K. Hellriegel, P. G. Kenedi, J. E. Kostura, L. Spagnuolo
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St. Louis: H. Kraus, D. McMurphy, W. Woelbel
San Antonio: D. E. Downard
Southern Tier: R. W. Ingraham
Toronto: A. Farrow, A. M. Hunter, R. Parkinson
Wichita: R. L. Bartholomew, H. E. Gilmer

REINSTATEMENTS

Chicago: A. J. D'Anna
Montreal: J. B. Lafond

TRANSFERS

Blue Ridge: D. Fineberg, from M-at-L
Bridgeport: J. R. Morris, from Cleveland
Chicago: J. K. Harlow, to Columbus, F. H. Meller, to Rockford
Cleveland: A. H. Losey, to Central Michigan
Dayton: C. T. Vannorsdall, to Pittsburgh
New York: N. Heller, from Baltimore
St. Louis: E. C. Bright, from Cleveland
Southeastern: R. H. Probert, to Miami
Member-at-Large: D. Fineberg to Blue Ridge

RESIGNATIONS

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Central Michigan: C. F. Gurnham, D. F. McDonald
Chicago: L. N. Peterson
Dayton: J. K. Easton
Kansas City: H. P. DeWitt
Los Angeles: R. E. Davis, F. H. Hesch
Montreal: W. H. Gauvin
New York: C. McGuire
Toledo: F. Criscio, J. Rocco
Waterbury: S. E. Judd

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Kansas City: P. A. Froeschl Jr.
St. Joseph Valley: M. Becknell, F. W. Berndt, F. R. Cader, R. H. Clarbour, D. P. Clemens, C. L. Crowell, D. R. Duff, G. E. Glancy, A. W. Johnson, G. T. Keeley, D. H. Lundberg, R. Mesha, H. G. Peters, R. Sprague Jr., D. V. Springer, R. H. Triebold
Wichita: C. H. Curry
Member-at-Large: A. Doria

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FUTURE MEETINGS

AMERICAN ELECTROPLATERS' SOCIETY

September	17—**Research Committee Meeting,** National Headquarters, Newark, N. J.
September	19–20—**Executive Board Meeting,** Hotel Statler, Detroit, Mich.
September	26—**Editorial Board Meeting,** National Headquarters, Newark, N. J.
October	4—**Montreal Branch,** Annual Dinner-Dance, Queen's Hotel, Montreal, Canada.
Oct. 31-Nov.	1—**Philadelphia Branch,** Annual Educational Session and Banquet, Hotel Sheraton, Philadelphia, Pa.
December	4–5—**Detroit Branch,** Annual Educational Session and Banquet, Hotel Statler, Detroit, Mich.
December	12–13—**Newark Branch,** Annual Educational Session and Christmas Party, Hotel Robert Treat, Newark, N. J.
January 17,	1959—**Grand Rapids Branch,** Annual Educational Session and Banquet, Pantlind Hotel, Grand Rapids, Mich.
January 31,	1959—**Chicago Branch,** Annual Meeting and Banquet, Conrad Hilton Hotel, Chicago, Ill.
January 31,	1959—**Cleveland Branch,** Annual Educational Session and Dinner-Dance, Cleveland, Ohio.
February 13–14,	1959—**Dixie Regional Group,** Educational Session and Banquet, Southeastern Host Branch, Dinkler Plaza Hotel, Atlanta, Ga.
February 14,	1959—**Sixth Interim Meeting,** Dixie Regional Group Sponsor, Southeastern Host Branch, Dinkler Plaza Hotel, Atlanta, Ga.
March 7,	1959—**Rockford Branch,** Annual Educational Session and Banquet, Faust Hotel, Rockford, Ill.
March 7,	1956—**Dayton Branch,** 13th Annual Meeting and Dinner-Dance, Dayton, Ohio.
April 4,	1959—**Fifth Tri-State Regional,** Louisville Host Branch, Louisville, Ky.
April 11,	1959—**Baltimore-Washington Branch,** Annual Banquet and Dance, Presentation of Pot.
April 11,	1959—**Empire State Regional,** Buffalo Host Branch, Hotel Peter Stuyvesant, Buffalo, N. Y.
April 18,	1959—**Twentieth New England Regional,** Waterbury Host Branch, Hotel Statler, Hartford, Conn.
April 25,	1959—**Milwaukee Branch,** Annual Meeting and Banquet, Schroeder Hotel, Milwaukee, Wis.

(Continued on next page)

FUTURE MEETINGS

(Continued)

June 15–18,	1959—**Golden Jubilee Convention and International Exposition, Including Fifth International Conference on Electrodeposition and Metal Finishing,** Detroit, Mich.
July 10–14,	1960—**47th AES Annual Convention,** Hotel Statler, Los Angeles, Calif.
June 18–23,	1961—**48th AES Annual Convention,** Hotel Statler, Boston, Mass.
June 25–28,	1962—**49th AES Annual Convention,** Schroeder Hotel, Milwaukee, Wis. Sponsorship Midwest Regional Council.
June 24–27,	1963—**50th AES Annual Convention,** Ambassador Hotel, Atlantic City, N. J. Sponsorship Newark Branch.

INTERSOCIETY

September	12—**Society of Plastics Engineers,** Regional Technical Conference, St. Clair Inn, St. Clair, Mich.
September	7–12—**American Chemical Society,** 134th National Meeting, Chicago, Ill.
Sept. 28–Oct.	2—**The Electrochemical Society,** Fall Meeting, Chateau Laurier, Ottawa, Canada.
October	27–31—**40th National Metal Exposition and Congress,** Sponsored by American Society for Metals, Cleveland Public Auditorium, Cleveland, Ohio.
November	5–6—**Society of Vacuum Coaters,** Fall Conference, Hotel Statler Hilton, Detroit, Mich.
November	18–20—**9th National Conference on Standards,** American Standards Association, Hotel Roosevelt, New York, N. Y.
January 27–30,	1959—**Society of Plastics Engineers,** 15th Annual Technical Conference, Hotel Commodore, New York, N.Y.
March 17–19,	1959—**National Association of Corrosion Engineers,** 15th Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill.
May 3–7,	1959—**The Electrochemical Society,** Spring Meeting, Sheraton Hotel, Philadelphia, Pa.

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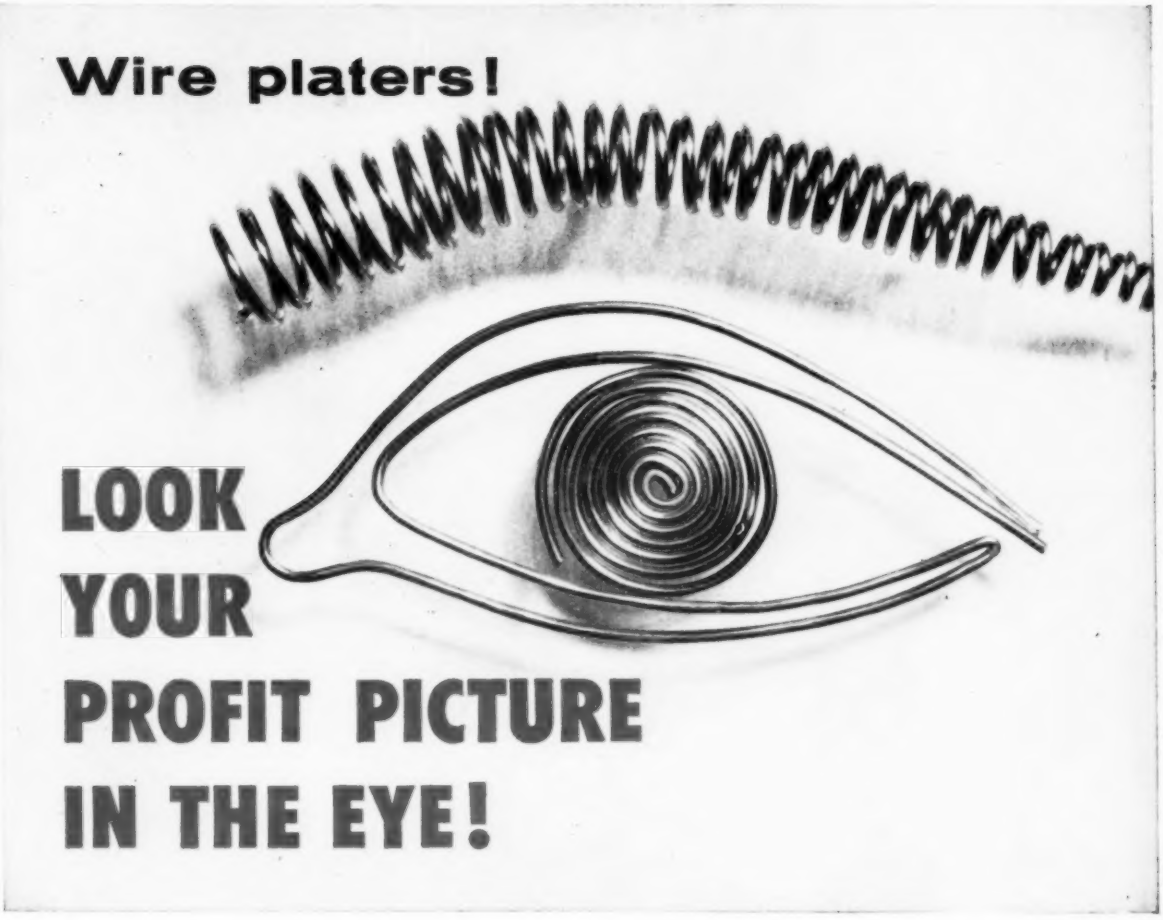

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